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BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES BULLETIN.

Vol. 36.] 1939. [No. 2.

SUMMARY OF RECENT ABSTRACTS.

II. YELLOW FEVER.*

Epidemiology.

JAMES (p. 110) gives a table of 111 cases with 84 deaths in South America and Africa during the 6 months ending 31st March, 1937, and a similar table (p. 486) of 349 cases with 287 deaths during the 9 months ending 30th September, 1937. The latter is an increase over the numbers recorded in the previous year.

FLU (p. 116) thinks that an atypical, usually unrecognized, form of the disease exists endemically in Surinam, and that it flares up in epidemic and typical form with the incursion of considerable numbers of susceptible persons. The evidence for this opinion is given. Only the existence of a comparatively innocuous virus and maintenance of the disease in atypical form during non-epidemic periods can explain why natives and whites who have lived long in yellow fever lands do not suffer severely during epidemics. This view is supported by further evidence :—

PELTIER, DURIEUX and MARTIN (p. 115) consider that an epidemic in French Guinea in 1932, supposed to be of influenza but with a mortality of 1,540 in 8,600 cases, was probably actually due to yellow fever. Their evidence includes the results of protection tests. JAMES (p. 486) records an epidemic in a missionary centre in Nigeria preceded by a rise in the death rate among local Africans, yellow fever not being then suspected. In a survey in French Equatorial Africa STEFANOPOULO (p. 114) found that a number of sera gave positive protection tests. [The figures are as follows :—Middle Congo, 277 sera tested with 59 positive, of which 104 with 19 positive were from children under 15. Gabon region, 272 sera tested with 33 positive, of which 95 with 10 positive were from children under 15. Tchad region, 129 sera tested with 37 positive, of which 115 with 36 positive were from children under 15.] These positive results in children indicate that the disease must still be present. Investigations added further support to the view that the test is sufficiently specific to be of value in determining the distribution of yellow fever.

* The information from which this series of summaries has been compiled is given in the abstracts made by the Sectional Editors in the *Tropical Diseases Bulletin*, 1938, Vol. 35. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

In the Lower Congo VAN DEN BERGHE (p. 491) found 14 positive sera in 114 collected from children. JAMES (p. 487) records that in Kordofan 70 to 80 per cent. of the inhabitants show yellow fever immune bodies in the blood.

SOPER (p. 114) concludes that the reported incidence of yellow fever is no safe index of its occurrence in endemic zones and that there is a vast silent reservoir of infection in the interior of South America. It extends to many districts in which *Aëdes aegypti* does not exist. HANSON (p. 487) reports an outbreak in Peru, apparently of the jungle type, with a high mortality. *Aëdes* is absent from the infected area.

OHLERICH (p. 488) shows how an epidemic was started in northern Chile by the introduction of a case into a hospital where mosquito nets were little used. The epidemic (of more than 100 cases) was controlled by anti-mosquito measures.

SOREL (p. 111) describes a missionary who had lived for 30 years in Africa, sometimes in the midst of epidemics of yellow fever. During this time he had never had any attack indicative of yellow fever. He then left and stayed for a year in Paris, but within a month of returning to the French Sudan he contracted the infection and died of it.

Aetiology.

DURIEUX (p. 495) states that the injection of patients' blood into the brains of mice affords a method of certain diagnosis on condition that the nature of the isolated virus is confirmed by protection tests with yellow fever immune serum. Thirteen strains were isolated in this manner. He considers that in human yellow fever, under the influence of the bile in the serum, the virus loses its viscerotropic but preserves its neurotropic properties for longer periods. Certain strains are much more virulent than others. Virus was found to persist in the blood of yellow fever patients up to the 5th day of fever. (See below, vaccination.)

SMITH (p. 496) found that mouse testis seems to be quite as suitable as mouse brain for the isolation of virus.

ROUBAUD, STEFANOPOULO and FINDLAY (p. 124) found that a culture virus kept for long periods either in mouse embryo tissue and then fowl embryo tissue, or in the latter alone, was not transmissible by the bites of mosquitoes.

WHITMAN (p. 122) titrated the virus present in *Aëdes* at various intervals after infection. The virus content falls during the first week and then increases rapidly to a higher level than at first. Multiplication therefore takes place. (For this author's experimental work on *Aëdes* larvae, see later, *Research.*)

Transmission.

WHITMAN and ANTUNES (p. 490) found that *Aëdes scapularis* and *Aëdes fluviatilis* are efficient vectors. *Aëdes nubilis, A. terrens, Mansonia justamansonia, M. fasciolata, M. chrysonotum* and *M. albicosta* failed to transmit, but the virus was retained in their bodies for long periods. Certain races of *Psorophora ferox* may be capable of transmission. ROUBAUD, COLAS-BELCOUR and STEFANOPOULO (p. 117) show that *Aëdes geniculatus* is an efficient carrier.

WHITMAN and ANTUNES (p. 489) demonstrated the transmissibility of two strains of jungle yellow fever by *Aëdes aegypti.* This is interesting in view of the fact that the virus seems rarely to be introduced into towns harbouring this mosquito, possibly because patients in outlying

districts (jungle) are not brought into towns within the period of their infectivity (the first 3–4 days of illness). But that it may be is seen in the small outbreak at Cambará, Paraná, recorded by WALCOTT *et al*, see below (*Prevention*). The strains used were the M.A.J. and Suarez strains and the incubation period found was 14 or 15 days, much longer than for the Asibi (urban) strain. This long incubation period may play a part in limiting the importation of jungle virus into towns since a greater proportion of infected insects would die before becoming infectious. Some of the rhesus monkeys infected showed delayed febrile response and at the time of fever virus had practically disappeared from the blood stream. If the human response is similar, many cases brought to towns for treatment would be no longer infectious for local *Aëdes*, which would limit the frequency with which jungle virus might invade urban centres.

ANTUNES and WHITMAN (p. 491) found that *Haemogogus janthinomys* retained the Asibi strain of virus for at least two weeks, and *H. uriartei* the M.A.J. strain (of jungle fever virus) for 16 days. Transmission, however, was not produced.

MATHIS (p. 117) compared strains of *Aëdes aegypti* from widely different countries. Cross fertilization can be effected, and the species is very homogeneous in all parts of the world. Three years previously Mathis had tried without avail to discover whether there were distinct races of *Aëdes aegypti* comparable with what is known to exist in the case of *Anopheles maculipennis*. *Aëdes aegypti* is therefore a serious potential danger as a carrier of yellow fever in any country.

The BULLETIN DE L'OFFICE INTERNATIONAL D'HYGIÈNE PUBLIQUE (p. 113) gives the *Aëdes* index for various African countries. It is prevalent throughout East and West Africa. JAMES (p. 486) shows that in a small epidemic in Accra there was a low *Aëdes* index in houses, but breeding was taking place freely in abandoned wells.

MACCALLUM and FINDLAY (p. 125) found that 22 out of 92 African monkeys showed immune bodies. In view of the essentially domestic character of *Aëdes aegypti* under natural conditions other mosquitoes must be regarded as potential vectors. 175 cattle and 70 sheep from Kenya were examined, with 13 and 3 respectively positive. The possibility of their having been exposed to infection cannot be excluded. Certain wild rodents and animals in West Africa were entirely negative. But it is also possible that virucidal properties may appear in cattle under certain physiological conditions, or as a result of bacterial or virus infections other than yellow fever, since in Uganda, where there are few human positive sera, the proportion in cattle is high, and in the Gold Coast the reverse is the case.

JAMES (p. 111) quotes FINDLAY's observation that 20 out of 88 monkeys caught in endemic areas in Africa gave positive protection tests, while the sera of monkeys from Kenya, India and Java were negative. The specificity of the protection test using cattle sera is doubtful.

Pathology.

HOFFMANN (p. 119) claims that the most reliable and quickest method of diagnosis in early epidemic cases in countries with latent endemic infection is the histological examination of post-mortem material. BABLET and BLOCH (p. 491) state that specific lesions can only be found in the liver. They also note that intranuclear inclusions in the liver cells, when they can be demonstrated, clinch the diagnosis.

MONTENEGRO (p. 119) regards the following changes as characteristic, and places them in descending order of diagnostic importance: 1. The Councilman-Rocha Lima cell [*i.e.*, liver cells containing the "Councilman bodies"]; 2. The Rocha Lima type of zonal necrosis; 3. General disorganization of the liver parenchyma; 4. Fatty changes. The Torres nuclear inclusions are of high diagnostic value if present, but they are not seen in all cases. No differences could be seen between the lesions of the jungle and the urban types.

Discussing the Councilman bodies, BABLET (p.112) describes the necrosis in the liver cells as being quite different from that observed in degenerative conditions produced experimentally by toxic agents. The cells show massive coagulation with homogeneous acidophile cytoplasm. Fine vacuoles indicate preceding fatty degeneration and nuclear structure is not apparent by ordinary staining methods. He suggests that the Councilman "hyaline bodies" should be known as globular cells with nuclear chromatolysis, and considers that they furnish the best known histological criterion of diagnosis. [At the same time no *single* lesion should be regarded as pathognomonic. It is the coincident existence of lesions on which pathological diagnosis rests.] MONTENEGRO (p. 492) gives in detail the lesions observed in liver tissue. He confirms BABLET's account of the "Councilman bodies."

NICOLAU, MATHIS and BAFFET (p. 118) describe a proliferation of glial cells with the formation of perivascular cuffs and mononuclear infiltration in the brain of a patient dead of yellow fever. The nerve cells in all parts showed the characteristic intranuclear bodies, and the glial cells often showed inclusions, especially those from the cortex.

Clinical.

MATHIS (p. 118) brings out, in the discussion of a case of yellow fever, the well-known fact that all the characteristic symptoms may be absent, including jaundice, black vomit and even albuminuria.

JORGE (p. 488) distinguishes three varieties, urban, rural and jungle yellow fever. The first two are transmitted only by *Aëdes aegypti* and man is the reservoir. In jungle yellow fever, wild animals constitute the reservoir and other kinds of mosquitoes may transmit the virus. Epidemics of the jungle variety are extremely diffused, usually away from inhabited regions. Most of the cases occur in February to April, after the hot weather; the mortality is lower than in the urban type and the clinical features are often difficult to recognize. FLU (p. 116) describes this form as existing close to primeval bush where *Aëdes* are not found. It affects men, who are the workers in the jungle, and not women [who do not accompany the men to work in the jungle], whereas yellow fever transmitted by *Aëdes* affects both sexes equally. Nevertheless the virus of the jungle form is identical with that of the ordinary urban form. It would appear that man is not the reservoir of the jungle form. PESTANA (p. 488) considers that yellow fever in São Paulo is now the jungle type.

DURIEUX (p. 495) shows that benign cases of yellow fever are common in both Europeans and Africans in French West Africa. These cases are a serious danger from an epidemiological point of view and emphasize the necessity for vaccination to secure adequate protection. JAMES (p. 487) quotes a British doctor in the Sudan whose blood, previously negative, gave a positive reaction after a visit to Kau during which he was confined to bed with fever for four to five days.

DURIEUX (p. 495) uses mice for diagnostic purposes since at advanced stages of the disease they seem to be more susceptible to intracerebral infection than are monkeys to intraperitoneal inoculation.

Prevention.

SOPER (p. 120) points out the necessity for anti-*Aëdes aegypti* measures in the protection of towns in endemic and possibly epidemic regions. A cycle of inspection greater than 7 days is justified only after *Aëdes aegypti* has been brought almost to extinction. WALCOTT, CRUZ, PAOLIELLO and SERAFIM (p. 115) describe an outbreak of the urban type (which, however, originated from a patient who contracted it in the jungle) which subsided promptly upon the introduction of adequate measures against *Aëdes aegypti*.

HUGHES (p. 121) has invented a mosquito-proof water closet flushing cistern, which he advocates in the prevention of *aegypti* breeding. The device can be attached to any cistern.

CUMMING (p. 493) shows that in the Southern United States no airport of entry is permitted within 20 miles of any town with a high index for *Aëdes*. In the Washington Public Health Reports (p. 122) is given the form of the certificate to be carried by all passengers on various American airplane services. SYMES (p. 113) gives details of a non-inflammable mixture for use in the spraying of aircraft, and DE BOER (p. 113) describes the anti-mosquito measures and methods of disinfestation of aircraft used at the Entebbe aerodrome in Uganda. *Aëdes* is absent from this aerodrome.

Vaccination.

FINDLAY and MACCALLUM (p. 112) vaccinated 65 persons with attenuated pantropic virus without immune serum. This virus had previously been used for the vaccination of 1,500 persons in Europe and America, and it is considered that by its means the possible dangers of inoculation of neurotropic virus with serum are avoided. The virulence of the strain has not been augmented by intrahepatic passages in monkeys, but its neurotropic properties do not seem to differ from those of the original strain. The use of tissue culture reduces the risk of contamination with other viruses. Three to four weeks after inoculation positive mouse protection tests were obtained with the serum of vaccinated persons.

These authors (p. 119) found 52 cases of jaundice (4 of which were probably due to food poisoning) in 2,200 persons vaccinated. Symptoms similar to those of common infective hepatic jaundice developed 2 to 7 months after inoculation, possibly due to a virus contained in the human serum used for suspending the chicken-grown yellow fever virus. A possible explanation is that the yellow fever virus may occasionally reduce the resistance of the liver to the agent of infective hepatic jaundice or other hepatotoxic substance.

Attenuated tissue culture virus without immune serum has been used in the vaccination of 600 persons by FINDLAY (p. 487) and of 6,000 in Brazil and Colombia, with slight reactions only.

SOPER (p. 493) from the experience of over 20,000 vaccinations shows that vaccination with virus modified by prolonged growth in fowl embryo tissue without serum is the method of choice. He records (p. 494) the occurrence of jaundice 2 to 8 months after inoculation, similar to that described by FINDLAY and MACCALLUM. These only

occurred in patients inoculated with two of several pools of monkey sera used with the virus.

Peltier, Duriex, Jonchère and Arquié (p. 494) found that serum containing bile neutralized yellow fever virus completely in four hours, provided that the jaundice was total. Bile salts are necessary for this phenomenon. The virus is probably not killed but only coated. Virus treated in this way has been used for vaccination. The serum of patients with total jaundice may thus give positive protection tests. It appears that brain tissue is necessary for this phenomenon since if phosphatic suspension of infected mouse brain or virus present in Seitz filtrate are used, the bile destroys the virus completely.

Sorel (p. 111) quotes a patient who had been vaccinated against yellow fever by three inoculations in August–September 1934. She became ill on 2nd October, 1936 and died of typical yellow fever on the sixth day. A specimen of her serum collected at the beginning of the attack was found to be no longer protective. It therefore appears to be necessary to vaccinate at intervals of 18 months or even every year. Bizien and Desnos (p. 117) report a patient who died of yellow fever although vaccinated 19 months previously with three doses of Laigret's vaccine.

Research.

Soper, Beeuwkes, Davis and Kerr (p. 496) show that antibody present in the serum of babies depends on its presence in the serum of the mothers. This initial immunity present at birth seems to be entirely passive and disappears usually within three months. The influence of maternal immunity on the results of protection tests in children may be disregarded after 12 and probably after 6 months.

Sellards and Bennett (p. 123) showed that 20 per cent. suspensions of mouse brains infected with the French neurotropic strain, in physiological saline containing 1 per cent. phenol, lost virulence completely after being kept at 37°C. for six days. Nevertheless, used as a vaccine, this gave some protection to mice, 21 out of 35 surviving, whereas 29 out of 31 controls died. Addition of cysteine to this vaccine augmented its efficiency, probably by restoring some of its lost antigenic power.

Whitman and Antunes (p. 489) found that *Aëdes aegypti* infected in the larval stage retained virus on emerging as adults, especially if the concentration of virus in the fluid in which the larvae were placed was high, even if the larvae were transferred to clean water after a few hours' contact with virus. Attempts to transmit virus through eggs were uniformly negative.

Nicolau and Baffet (p. 119) and Stefanopoulo, Nagano and Wassermann (p. 497) have investigated the susceptibility of various animals to yellow fever virus. *C. W.*

TROPICAL DERMATOLOGY.

A Review of Recent Articles, V.*

Blastomycosis.—Once again the majority of publications have been concerned with chromoblastomycosis. Carrión and Pimentel-Imbert[1] describe the first case to be recognized in the Dominican Republic. The patient was a male native labourer, aged 60, in whom the disease had started some 20 years earlier whilst he was working barefooted in a tuber plantation. At that time a small wart appeared on the right external malleolus. This gradually spread until a diffuse thick swelling involved the whole of the outer side of the foot. A superimposed tumour was well defined but had an irregular and polycyclic border; it extended from the external malleolus, round the tendo Achillis, nearly to the internal malleolus. The centre of this mass was slightly depressed and violaceous, consisting of scarring and some scattered warts. Its edge was raised 8 mm. above the surrounding skin and was lobulated and papillomatous, with some slight scaling and crusting. A full description is given of the cultures and microscopical appearances of the organism. This was of the *Hormodendron pedrosoi* type, but exhibited a slower rate of growth, an unusual length of the conidia and a variability in the production of aerial mycelium. The case reported by Gomes[2] is interesting in several ways. A white Brazilian, aged 51, cut his hand on the branch of a eucalyptus tree. This wound healed in a month under dressings with hydrogen peroxide but vesicles appeared in the scar eight days after apparent cure. These were sharply defined and gradually acquired a verrucous surface. X-rays demonstrated osteoporosis of the first and second phalanges of the left hand. Details are given of the organism, a Hormodendron, but the experimental work is of greater importance. By intradermal inoculation the author succeeded in infecting guinea-pigs, rats and rabbits. It is claimed that this constitutes the first experimental reproduction of the disease. The same fungus was isolated from the offending tree branch. In Java, Müller, Essed and Hazebroek[3] detected the disease on the left buttock of a 60-year-old native. There was no history of antecedent trauma but this might be negatived by the fact that three years had elapsed since the lesion had first been noticed. The fungus was proved to be *Trichosporon pedrosoi*. The article is well illustrated. Martin[4] has published the

* For the fourth of this Series see Vol. 35, pp. 89–94.

[1] Carrión (A. L.) & Pimentel-Imbert (M. F.). Chromoblastomycosis in the Dominican Republic.—*Puerto Rico Jl. Public Health & Trop. Med.* 1938. June. Vol. 13. No. 4. pp. 522–530. With 5 plates. [Spanish version pp. 531–539.]

[2] Gomes (J. M.). Chromoblastomycosis caused by a Fungus of the Genus Hormodendron.—*Arch. Dermat. & Syph.* 1938. July. Vol. 38. No. 1. pp. 12–18. With 4 figs.

[3] Müller (H.), Essed (W. F. R.) & Hazebroek (F. E. A.). Een geval van chromoblastomycose in Oost-Java.—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1937. Dec. 21. Vol. 77. No. 51. pp. 3259–3268. With 10 figs. on 2 plates. English summary (4 lines).

[4] Martin (Donald S.). The Antigenic Similarity of a Fungus *Cadophora americana* isolated from Wood Pulp to *Phialophora verrucosa* isolated from Patients with Dermatitis Verrucosa (Chromoblastomycosis).—*Amer. Jl. Trop. Med.* 1938. July. Vol. 18. No. 4. pp. 421–426. [10 refs.]

TABLE 1.—*Clinical and Mycologic Differentiation of Coccidioidal Granuloma, Blastomycosis and Paracoccidioidal Granuloma (North American, South American and European)*

Disease	Fungus	Clinical Characteristics	Organisms in Tissue or in Pus	Gross Cultures	Microscopic Cultural Appearance
Coccidioidal granuloma (Posadas' disease, 1892) (Rixford and Gilchrist, 1894) (Rixford and Gilchrist, 1894)	Coccidioides immitis	Infectious granuloma; acute, subacute or chronic; protean, with lesions either cutaneous, subcutaneous or systemic, involving generally the respiratory system; lesions may be nodular, ulcerative, papillomatous, verrucoid, resembling a gummatous tumour or a cold abscess	Cells isolated or in giant cells; spherical, thick walled with a reported diameter of approximately 2-80μ; reproduces by endospore formation (ascus); budding absent; wall of ascus often showing radiate formation	Colonies flat, somewhat submerged, grayish, becoming white to light cream, with aerial hyphae; cottony, at times coremioid; color changes to light chamois and to smoky brown with age; growth rapid	Hyphae septate, branching, 0·5-4μ in diameter; hyphal swellings, arthrosporous cells 2·5-7μ in diameter, 5-12μ in long axis; chlamydospores abundant, 5-8μ in diameter; racquet mycelium; terminal hypnospores approximately 5×8μ; endogenous spore formation in anaerobic conditions
North American blastomycosis (Gilchrist's disease, 1894)	Zymonema dermatitidis Zymonema capsulatum Zymonema capsulatum var. Isabellinus	Infectious condition often granulomatous; acute to chronic; protean, with lesions cutaneous or systemic; cutaneous lesions primary or secondary, papulo-ulcerative, verrucous or papillomatous, gummatous, showing typical violaceous color	Simple or budding yeastlike cells, thick walled, approximately 5-20μ in diameter, usually approximately 7μ	Colonies in general at first yeastlike, then prickly (coremioid), finally profuse and cottony, changing from white to chamois then to cinnamon and to brown; show radiating ridges and concentric rings of growth; Z. capsulatum remains white, and var. Isabellinus is a light chamois; growth rapid	Hyphae septate, branching, 2-4μ in diameter; conidia pyriform or round, pedicellate or sessile, 5μ in diameter; racquet mycelium; 5-6×3·5μ; chlamydospores terminal or lateral, 5·5-7·5×12-15μ or spherical, 7μ in diameter; ascogenous cells spherical, 8-13μ in diameter
European blastomycosis (Busse-Buschke's disease, 1894)	Cryptococcus hominis Atelosaccharomyces hominis (Torulopsis neoformans)	Similar clinically to Gilchrist's disease but ulcerative type common in cutaneous form, with abscesses, little inflammation; usually found invading cerebrospinal system	Thick-walled, heavily encapsulated, simple or budding cells approximately 5-10μ in diameter, occasionally larger, usually approximately 8μ	Colonies yeasty or pasty, smooth, mucoid to moist, subpulvinate; color light cream, becoming light tan to brown with age; growth fair	Spherical to ovoid budding, encapsulated cells approximately 2-6μ in diameter, rarely larger; no mycelium, pseudomycelium or spores
South American blastomycosis Paracoccidioidal granuloma (Lutz-Splendore-de Almeida disease, 1908) A. Generalized type B. Localized type affecting the buccal mucosa	(*a*) Paracoccidioides brasiliensis (*b*) Paracoccidioides tenuis (*c*) Paracoccidioides cerebriformis	A. Generalized or localized, cutaneous or systemic, granulomatous, papulous, verrucous or ulcerative; acute to chronic; usually lymphangitic in spread B. Lesions localized on buccal mucosa; acute to chronic; verrucous, papillomatous; ulcerative, granulomatous; lymphangitic spread only in terminal stage	(*a*) and (*b*) Cells spherical or ovoid 1-30μ in diameter, rarely larger, with thick walls; simple or multiple budding of minute, spherical, ovoid or bacillary gemmules, of approximately 1μ and larger (*c*) Cells spherical or ovoid, 3-30μ in diameter, rarely larger, but uniformly larger than those of P. brasiliensis or P. tenuis; thick walled, with simple or multiple budding of small, spherical, ovoid, or elongated gemmules of approximately 3μ or over; cells often found in giant macrophages (pseudo-coccidioides)	(*a*) White, adherent to substratum and somewhat hard, well defined, somewhat cottony; colonies become light tan with age; growth slow (*b*) Mycelium mostly submerged; colonies compact, verrucoid or vermiculate at inoculation, showing folds or radiating ridges; white, becoming light tan with age; growth slow (*c*) On agar, cerebriform to vermiculate, yeastlike, creamy buff, becoming light cinnamon-buff with age; easily separated from substratum, but filamentous, flat and adherent to dry portions of substratum; growth slow	(*a*) Hyphae septate, branching, 1·5-3·5μ; hyphal swellings 3-5μ; spherical, terminal chlamydospores up to 15μ; intercalary chlamydospores 6-10μ; irregular sclerotic, intercalary cells 7×15μ; conidia lateral, sessile or pedicellate, 3-7μ (*b*) Same as P. brasiliensis, except that corresponding structures are smaller (*c*) Hyphae irregular, septate, branching, 2-7μ in diameter, with many swellings; cells arthrosporous, oidoid, dumbbell shaped; chlamydospores spherical, elongate, pyriform or sclerotic, intercalary, lateral or terminal, up to 15μ; conidia lateral, spherical or pyriform, 3-10μ

results of his work on antigens. Seven species of *Cadophora americana*, obtained from the United States, were compared with specimens of *Phialophora verrucosa* procured from patients in Texas, Uruguay, North Carolina, Porto Rico and South America. The experiments were carried out on rabbits and it was found that one type of *Cadophora*, isolated from wood pulp, gave results very closely approximating to those obtained with *P. verrucosa*. The remaining six species differed very widely from these, both antigenically and morphologically. The importance of a paper published by MOORE[5] lies chiefly in its extensive pathological work, for the references to clinical features are but brief. It deals with blastomycosis, coccidioidal granuloma and paracoccidioidal granuloma and is a comparison of North American, South American and European types. The chief differences are most easily appreciated by a reference to the accompanying table, which is reproduced from his well-illustrated article.

Coccidioidosis.—Studies of the metabolism of *Coccidioides immitis* (Stiles) are published by STEWART and MEYER[6]. The organism is resistant to desiccation but the chlamydospore develops under conditions of drying. It is apparently impossible to infect animals in the absence of this spore. It therefore seems probable that this resistance to drying is an important factor in the dissemination of the organism in the San Joaquin Valley of California. They have devised a synthetic medium which possesses selective properties of great value in the isolation of the organism from soil and clinical material. This consists of distilled water containing 1 per cent. ammonium chloride, 1 per cent. sodium acetate, 0·2 per cent. acid potassium phosphate, 0·2 per cent. potassium phosphate and 0·01 per cent. magnesium sulphate. There are no significant differences of metabolism shown between specimens grown in the above medium and those grown in a protein rich medium. Glucose is assimilated by coccidioides and by blastomyces. This change does not suppress the production of ammonia but even favours it, a fact which shows a great difference between the metabolism of these organisms and that of bacteria and certain protozoa. The authors lay great stress on the fact that fungi require their own types of media. Such should be chemically defined so that they can form a " common denominator " allowing exact correlation of results reported by investigators in different countries.

Maduromycosis.—The fourth case to be reported from North America is described in great detail by HANAN and ZURETT[7]. The patient was a male Hindu who had been born near Delhi but who had lived in the United States for 18 years. In 1933, when aged 36, a splinter entered the dorsum of the left foot when he kicked a piece of old wood. The wound healed rapidly, but six weeks after the accident swelling appeared at the site. This gradually increased but ulceration did not appear until two years later. This story is partially

[5] MOORE (Morris). Blastomycosis, Coccidioidal Granuloma and Paracoccidioidal Granuloma. Comparative Study of North American, South American and European Organisms and Clinical Types.—*Arch. Dermat. & Syph.* 1938. Aug. Vol. 38. No. 2. pp. 163–190. With 11 figs. [45 refs.]

[6] STEWART (R. A.) & MEYER (K. F.). Studies in the Metabolism of *Coccidioides immitis* (Stiles).—*Jl. Infect. Dis.* 1938. Sept.–Oct. Vol. 63. No. 2. pp. 196–205. With 2 graphs. [22 refs.]

[7] HANAN (Ernest B.) & ZURETT (Sophia). A New Species of Madurella : Isolation and Identification in a Case of Maduromycosis.—*Arch. Dermat. & Syph.* 1938. June. Vol. 37. No. 6. pp. 947–966. With 9 figs.

confirmed by the fact that the man was in hospital in 1932 for bronchitis and no foot lesion was present at that time. On examination a mass measuring 4×5 cm. was found on the dorsum of the left foot. It felt like a multilocular cyst and was freely moveable except at one point where it was attached to the epithelium. At this point the skin was thickened, hyperpigmented and eczematous. The whole was excised and the mass was then found to consist of encapsulated cysts, each measuring 5 mm. in diameter. Each contained a dark brown serous fluid with some black grains in the centre. These grains were turned red by nitric acid. Excellent pictures illustrate the pathological investigations, as a result of which it is claimed that a new species has been isolated. It is proposed to use the name *Madurella lackawanna*, the descriptive adjective being borrowed from a locality near Buffalo. The " mycelium is white or smoky gray, with a white periphery in old cultures. The colony tends to be spherical, with a central mycelial zone and a peripheral zone. Growth is successful only on Sabouraud's dextrose agar and glycerine agar when enriched with liver infusion. The hyphae vary in dimensions from 1 to 5 microns and are coarsely granular. Septums are rare in early cultures, but definite fine septums with smoky gray mycelium appear in later cultures at room temperature. Chlamydospores appear early in the spore zone. There are nodular organs, consisting of arthrospores with square-cut ends, in the peripheral mycelium late at room temperature. The optimal medium is fresh liver or liver infusion—Sabouraud's dextrose agar. The optimal temperature is between 20° and 37°C. The organism does not liquefy gelatin, digests milk protein, does not ferment milk lactose and does not digest milk fat. Pigment formation is abundant but blackening of the medium is more pronounced at room temperature, except on glycerin agar enriched with liver. There is little or no growth on fluid mediums. Animal inoculation gives negative results." The first case in which the disease has apparently been contracted in the Dutch East Indies is described by Boers, Kouwenaar and Wolff[8]. Actually, too, it is only the fourth case to be reported in that area. The man was a Punjabi who had lived on the east coast of Sumatra for 20 years. The total history covered only 12 months. The fungus was of the black grain variety and closely approximated to the descriptions of *M. americana*. Treatment was successful after eight months' intravenous injections of sodium iodide. In all, 50 were given, each consisting of 25 cc. of a 10 per cent. solution.

Piedra.—The black variety is common in Cochin China and Souchard and Nguyen-van-Huong[9] found large numbers of Annamese to be affected. The nodosities are very black and very hard, measuring 1 to 2 mm. in length and 300 to 400 microns in diameter. Both shape and size were, however, somewhat irregular. Whilst it appears that the organism has not hitherto been detected in this part of the world it would seem to be identical with the Brazilian black piedra in all respects, clinically, macroscopically, microscopically and in culture.

[8] Boers (E. R. J.), Kouwenaar (W.) & Wolff (J. W.). Mycetoma pedis (Maduravoet).—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1938. July 5. Vol. 78. No. 27. pp. 1606–1613. English summary.

[9] Souchard & Nguyen-van-Huong. La piedra noire de Cochinchine.—*Ann. Parasit. Humaine et Comparée.* 1937. Nov. 1. Vol. 15. No. 6. pp. 539–543. With 3 figs.

Ringworm infections.—GOHAR[10] has analysed 300 cases of scalp infection. All occurred in Egyptians, two-thirds of them living in Cairo and the remainder in the neighbouring villages. There were 176 cases of favus, all being caused by *A. schoenleini*, the most common incidence being between the ages of five and eight. There were 119 cases of *T. violaceum* infection, usually occurring between the ages of five and ten; this disease was rather more common in the town, whilst favus cases were more common in the country districts. The *T. violaceum* cases ran a shorter course than did those of favus. All the *A. schoenleini* cases were chronic and the crater was remarkable by its absence, pustules causing some resemblance to seborrhoeic lesions. There were four instances of infection by *M. canis*, whilst *T. tonsurans* was only found on one occasion. Boys (179) outnumbered girls. A similar investigation has been carried out in Batavia by BOEDYN and VERBUNT[11] who have studied the material obtained from 106 cases during 1936. They only succeeded in getting 42 positive cultures and of these but 10 were uncontaminated. These ten are described in great detail and at least two new species are claimed among them. One fungus which was found in groin lesions they propose to call *Proteomyces variabilis* (Boedyn and Verbunt) whilst some cases of piedra showed a fungus which they call *Piedraia javanica* (Boedyn and Verbunt). Large drawings accompany these descriptions. Other cultures proved to be *Epidermophyton rubidum*, *E. interdigitale*, *Trichophyton plicatile*, *Favotrichophyton ochraceum*, and *F. decipiens*. From the small amount of material available it would seem that epidermophyton infections head the list, followed by piedra, pityriasis versicolor and microspora, in that order. LEWIS, MONTGOMERY and HOPPER[12] have studied *T. purpureum* (Bang) in great detail. The history, geographical distribution, microscopical and cultural characteristics are reviewed. They have studied 100 cases, the average duration of infection being three years. As the disease is so resistant to treatment experimental inoculation of volunteers was not attempted. The feet were involved in 86 cases, the hands in 39, trunk in 15, the inguinal region in 12, a curious gyrate eruption was found on the body in 4, and the face was attacked twice. In all, 68 patients showed nail infection. Some exacerbation occurred during the summer months, but the clinical features always involved serious differential diagnosis from psoriasis, arsenical dermatitis of the palms, neurodermatitis, eczema, sycosis and erythema annulare centrifugum. Indeed diagnosis sometimes depended on the results of culture. On the palms and soles the skin was dull red, slightly thickened and bore a branny desquamation. The edge was always sharply defined but there was no trace of vesiculation. Fissuring of the patches occurred when they involved the interdigital spaces and the joint areas of the hands. On the body the same dull red scaly appearance was presented but there was also some tendency to central resolution of the circinate

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[10] GOHAR (N.). The First Survey of Ringworm in Egypt.—*Jl. Trop. Med. & Hyg.* 1938. July 15. Vol. 41. No. 14. pp. 229–234. With 3 charts.

[11] BOEDYN (K. B.) & VERBUNT (J. A.). Annotations about Dermatomycoses in Batavia.—*Mycopathologia.* The Hague. 1938. Sept. 16. Vol. 1. No. 3. pp. 185–198. With 4 figs. & 6 plates.

[12] LEWIS (George M.), MONTGOMERY (Royal M.) & HOPPER (Mary E.). Cutaneous Manifestations of Trichophyton Purpureum (Bang).—*Arch. Dermat. & Syph.* 1938. May. Vol. 37. No. 5. pp. 823–839. With 8 figs. [25 refs.]

patches so that there was a superficial resemblance to tinea circinata. Sometimes the plaques were thicker and more heavily scaling, whilst in others the configuration was bizarre, even suggesting tinea imbricata. The nails were opaque, lustreless, friable, yellowish, irregular and showed subungual hyperkeratosis. In spite of deep involvement of the nail the surrounding tissues were sometimes unaffected, the interdigital skin even being clean. A case of generalized infection with *T. rubrum* is described by GODAL[13]. The patient was a soldier who had just returned from Indo-China, having previously served in Madagascar and China. The disease was said to have been present for ten months. Practically the whole of the glabrous skin bore sharply defined, large red plaques with slight flaking and vesiculation at the polycyclic edges. There was some lichenification, with folliculitis and scattered pustules. The nails and hair were unaffected. The same fungus has been studied by CATANEI[14] who obtained material from a native of Tonking, the lesions being on the buttocks, flanks and umbilicus. The scales showed very numerous mycelial elements, sometimes moniliform. Cultures were at first smooth and white but the centre became heaped and downy after three weeks. At this time the colony had assumed a reddish purple colour except for the centre, which remained whitish. Pathogenicity to guineapigs and monkeys was proved but the hair was not attacked in them. This organism corresponds with *T. rubrum* (Castellani 1909) and is placed in the second section of trichophyta in the classification of Langeron and Milochevitch. FRASER[15] has investigated the viability of epidermophyta and trichophyta in an attempt to account for the disappointing results seen in the treatment of foot infections. The fungi remain viable in scales for over a year and *in vitro* they withstand cold better than heat. Attempts to infect dry scarified skin were always unsuccessful; moisture seemed to be an essential factor in the successful experiments. The *p*H in the fourth interdigital space was found to be high and might possibly be caused by decomposition of sweat. The fungicidal properties of many chemicals and physical agents were reviewed. It is stressed that X-rays, in safe doses, never kill fungi, which are also more resistant to ultra-violet light than are bacteria. Perchloride of mercury and iodine seem to be the most efficient chemicals, phenol, dyes, etc., being far behind them. Whilst it is true that viability in scales is persistent there is no direct proof that pathogenicity is retained. Most treatments also have a penetrative effect so that it is difficult to account for the therapeutic failures. It is concluded that greater attention must be paid to the soil, *i.e.*, hygiene and ventilation of the feet are of supreme importance.

Yeast infections.—Dermatitis eutorulosa is the name given by KESTEVEN[16] to 13 cases which showed "localised papulo-vesicular

[13] GODAL (J.). Un cas d'épidermophytie généralisée à *Tricophyton rubrum*.—*Bull. Soc. Path. Exot.* 1938. May 11. Vol. 31. No. 5. pp. 337–339.

[14] CATANEI (A.). Sur la place de *Trichophyton rubrum* dans la classification. Etude parasitologique et expérimentale d'une nouvelle souche de ce champignon.—*Arch. Inst. Pasteur d'Algérie*. 1938. June. Vol. 16. No. 2. pp. 227–231. With 3 figs. on 1 plate.

[15] FRASER (P. K.). The Viability of Some Common Pathogenic Fungi.—*Jl. Trop. Med. & Hyg.* 1938. Oct. 1. Vol. 41. No. 19. pp. 310–314. [72 refs.]

[16] KESTEVEN (H. Leighton). Dermatitis Eutorulosa, with a Description of the Causative Fungus.—*Med. Jl. Australia*. 1938. June 4. 25th Year. Vol. 1. No. 23. pp. 963–967. With 3 figs.

and/or excoriated and weeping inflammatory condition of the skin, due to invasion of the skin by *Eutorula excorians* Kesteven, and causing more or less itching." The clinical diagnosis cannot be made with certainty but the presence of a sodden fringe to the patch with the presence of vesicles is suggestive. Between the toes the skin is markedly sodden and white, but blisters are more common on the side of the foot. The organism has also been found in an acute red intertrigo of the groins, in an indefinite vesicular eruption of the legs and arms, and on the palms where the edges of the lesion are more definitely sodden and may even bear pustules as well as vesicles. It may cause a chronic paronychia which shows no crusting but a watery discharge. The author has succeeded in producing typical lesions on his own arm by inoculation of this yeast and has also recovered the organism from the resultant " dermatitis". Treatment has proved efficient by the use of a 1 per cent. solution of dihydroxyanthranol in benzol, by a 1 per cent. solution of paradinitrophenol in water and by the free use of Tinct. iodi. A full description of the organism is included, the author concluding with a criticism of the vague and muddling nomenclatures and poor descriptions of fungi in general and of yeasts in particular.

Achromia.—Castellani[17] describes this condition as seen in Central America and the West Indies. The moulds and fungi which have been described in these cases are regarded as non-pathogenic by the author. (The variety of achromia seen in Cuba by Pardo-Castello [see this *Bulletin*, 1937, Vol. 34, p. 250] is different and is caused by fungi). The face and neck are most commonly attacked. The patches, which may be as large as half-a-crown, are at first slightly wrinkled and scaly, later becoming smooth. There is never complete loss of pigment so that the areas appear to be yellow or pale yellow when they occur in negroes. There are no subjective symptoms whatever and the discs seldom coalesce. They are very persistent but sometimes do repigment. The differential diagnosis from a case of tinea flava in which the fungus has disappeared is practically impossible. All treatment, including antimycotic remedies, is useless. Some disguise can be obtained by the use of an appropriate dilution of potassium permanganate.

Mycosis fungoides.—Wilson[18] has treated four cases of this disease by means of injections of ethyl chaulmoograte, as first suggested by Lumholdt in the *Acta Derm.-Ven.* during September 1936. The treatment is long and tedious, requiring exact determination of the dosage in each case. Three cc. have even been injected twice a week for as long as 12 months. Although there is cessation of itching after the third or fourth injection, there is no suggestion that cure has ever been attained.

Xeroderma pigmentosum.—The disease has been seen in five children out of a family of six by Burnet[19] *et al.* The parents are young natives

[17] Castellani (Aldo). Achromia Flava Amycotica (Pseudotinea Flava, Achromia Flava Tropicalis).—*Jl. Trop. Med. & Hyg.* 1938. Oct. 1. Vol. 41. No. 19. pp. 309–310. With 1 fig.

[18] Wilson (Sidney J.). Ethyl Esters of Chaulmoogra Oil Therapy in the Treatment of Mycosis Fungoides.—*Southern Med. Jl.* 1938. June. Vol. 31. No. 6. pp. 675–678.

[19] Burnet (Et.), Jadfard (H.) & Larabi (M.). Chronique tunisienne du *Xeroderma pigmentosum* XIX^e^, XX^e^, XXI^e^, XXII^e^, et XXIII^e^ observations (23e, 24e, 25e, 26e et 27e cas).—*Arch. Inst. Pasteur de Tunis.* 1938. Sept. Vol. 27. No. 3. pp. 304–307.

of Tunis. Although there was no previous family history of the disease it is noteworthy that the parents are cousins. The two eldest children, both girls, died at the ages of 7 and 6 years. Since then the other children have been kept indoors; these are now aged 5 years, 3 years and 14 months. The first signs developed at the ages of 12, 9 and 6 months respectively. The sixth and youngest child died of diarrhoea at the age of three months, at which date no skin changes had appeared. All the cases are typical. In another Tunisian family of five children, two sisters now aged 20 and 16, suffer from xeroderma pigmentosum which first started at the age of four years in both. These have been described by CHATELLIER[20]. Twenty-five cases of this disease (including all the above) have now been detected in Tunis.

Mango dermatitis.—One of the most interesting papers has been contributed by KIRBY-SMITH[21]. Cases of this affection have been noted since 1932 but so far they have not been mentioned in any text-book. The mango, a member of the Anacardiaceae, as is the poison ivy, is very sensitive to cold so that its distribution in the United States is restricted to Florida. A world-wide questionary revealed the fact that the dermatitis has been seen and recognized occasionally in India, Mexico, Brazil, the Philippines and Colombia. The hands, neck and face, particularly the lips, are the sites of election. Stomatitis may also be present and an acute gastro-enteritis often completes the picture. Six to twenty-four hours after contact with the fruit, usually, of course, direct eating, there appear vesiculation and oedema of the face and lips. Burning and itching are always present and in some cases the effects are so severe that prostration ensues, but no deaths have ever been noted. It is generally believed that the substance of the fruit is innocuous, but it is undoubtedly true that the peel, resin from the stem or sap itself can be causative. Tests show that the irritant is non-protein, non-volatile and is destroyed by exposure to 56°C. for five minutes. It is soluble in ether, chloroform, alcohol, etc. Oxidation has apparently destroyed it in the older exposed resin-like sap. Thirty-five volunteers underwent tests and five of them gave positive reactions. The author has succeeded in collecting 86 positive reports in all, most of them coming from Florida.

Sydney Thomson.

GAVIÑA ALVARADO (E. R.), NEGRI (Tomas) & MOSTO (Domingo). Esporotricosis de pierna. [**Sporotrichosis of the Leg.**]—*Prensa Méd. Argentina.* 1938. Sept. 7. Vol. 25. No. 36. pp. 1685–1695. With 5 figs. [46 refs.]

A general account of sporotrichosis with an illustrative case in a Spanish woman, 50 years of age. This calls for no further detail here. The author gives an elaborate classification, based on clinical findings and appearances, dividing cases into three main groups: 1. With more or less local extension; 2. More widespread with lymphangitis and perhaps lymphadenitis; 3. With ulceration and abscess formation. Each of these is further subdivided and in a table over 30 clinical forms are named.

H. H. S.

[20] CHATELLIER (Louis). XXIVe et XXVe observations du *Xeroderma pigmentosum* en Tunisie.—*Arch. Inst. Pasteur de Tunis.* 1938. Sept. Vol. 27. No. 3. pp. 308–310. With 8 figs. on 2 plates.

[21] KIRBY-SMITH (J. Lee). Mango Dermatitis.—*Amer. Jl. Trop. Med.* 1938. July. Vol. 18. No. 4. pp. 373–384. [54 refs.]

RELAPSING FEVER AND OTHER SPIROCHAETOSES.

Précis of Abstracts in this Section.

In the section which follows, Chang (p. 107) reports on the clinical findings and treatment of cases of relapsing fever. In Changsha the disease is louse borne and is common among dealers in old clothes and rare in children ; an explanation for this is offered. Sergent (p. 108) records failure of vaccination by dead spirochaetes. Latent infection may persist in guineapigs for nine months and may produce a state of "racial premunition" for two years. Moise (p. 108) considers that *O. savignyi* is the vector in Abyssinia and Avanessov (p. 109) incriminates ticks of the genus *Ornithodorus*, species as yet not identified, in Afghanistan, while Wheeler (p. 109) shows that *O. hermsi* is a vector in California. An obscure case of spirochaetal infection in Kentucky is described by Palmer (p. 109). Feng and Chung (p. 110) record the results of the incubation of infected ticks at various temperatures. Joyeux and Sautet (p. 110) were successful in producing infection in rats fed on the brains and viscera of previously infected animals, thus demonstrating the possibility of alimentary infection, while L'Abbate and Mannino (p. 111) consider that Mannino became infected through a spurt of blood from a patient with relapsing fever, which entered his nostril accidentally. Chung and Feng (p. 111) failed to infect splenectomized squirrels by means of infected bedbugs (*Cimex lectularius*). True positive reactions to Kolmer's Wassermann, Kahn and Kline tests were not given by patients with relapsing fever, unless there was concurrent syphilis, in a series of 238 specimens investigated by Ts'un and Chung (p. 111). Brussin and Sternberg (p. 112) show that if mice infected with *S. recurrentis* are given an injection of neosalvarsan there follows a very marked production of antibodies. They record experiments on these lines in splenectomized animals and in those in which the R.E. system is blocked. In their second paper (p. 113) these authors show that the earlier salvarsan was given, the slower was the development of antibodies, and that the killed spirochaetes apparently acted as vaccines. *C. W.*

Chang (Shih-lu). **Relapsing Fever in Changsha. A Report of 41 Cases.** —*Chinese Med. Jl.* 1938. Aug. Vol. 54. No. 2. pp. 163–172. [15 refs.]

A study of 41 cases (4 fatal) of relapsing fever during the four years, 1933–36, in the province of Changsha. 41 per cent. of the cases occurred amongst dealers in old clothes, etc., which is not surprising in view of the fact that the disease is louse-borne. No case was observed in children below nine years old, and the comparative rarity of the disease in children seems to be owing to the fact that they seldom crush the lice on the skin, which is necessary in order to produce infection.

Fever, anorexia, headache, body-aches and constipation are the most common symptoms, and the onset is nearly always acute. Jaundice and enlargement of the liver and spleen are often observed. A high leucocytosis, and also intense jaundice and liver enlargement are considered signs of poor prognosis. In 28 cases, 11 had a positive Wassermann and 4 a positive Kahn test. On re-examination, 5 out of 6 of the former had become negative ; 1 of the latter remained positive.

Thirty-two cases were treated with 0·15 to 0·3 gm. neosalvarsan, but the smaller dose is considered sufficient. Five patients showed a bad reaction and 3 died. Nine cases were treated with 2 to 3 cc. of acetylarsan. Glucose given intravenously immediately before the arsenic treatment is said to have reduced untoward reactions.

Relapses occurred in three cases, of which one might have been due to reinfection. *E. Hindle.*

Cleland (J. B.). **A Death from Relapsing Fever in Australia.**—*Med. Jl. Australia.* 1938. May 7. 25th Year. Vol. 1. No. 19. pp. 820–821.

The record of the case of an Indian seaman who died in Adelaide in 1921. The enlarged spleen was kept in the museum and has now been re-examined and found to contain spirochaetes. *E. H.*

Sergent (André). Fièvre récurrente à *Spirochaeta hispanicum* en Algérie. Transmission par le rhipicéphale du chien. Prémunition. Sérum de convalescents. [**Relapsing Fever caused by** *Spirochaeta hispanica* **in Algeria. Transmission by the Dog Tick,** *Rhipicephalus.* **Premunition. Convalescent Serum.**]—*Ann. Inst. Pasteur.* 1938. Sept. Vol. 61. No. 3. pp. 217–254. With 14 figs. [21 refs.]

A valuable résumé of observations on Algerian relapsing fever prepared in memory of the late André Sergent.

Most of the results have been previously reviewed in this *Bulletin*, but some further details are included.

Attempts at vaccination by means of dead spirochaetes, killed either by cold or exposure to bile, gave negative results. Treatment of infected guineapigs by the serum of refractory animals produced disappearance of the spirochaetes when pig serum was injected, and when the organisms reappeared they were less numerous than in control guineapigs. Donkey serum had no effect. Novarsenobenzol was found to have no curative effect on this infection except in toxic doses.

The latter half of the paper is concerned with latent infection and "premunition." The duration of the latent infection was tested by killing guineapigs at various intervals after the first attack, and injecting emulsions of the brain into normal guineapigs. The results show that infection can persist up to nine months after the original attack and also confers a "*racial premunition*" which can last for at least two years in the guineapig. This is accompanied by a "specific premunition" which is less intense than the racial premunition, but, when present, causes the partial or complete suppression of any attacks resulting from reinoculation.

Finally, details are given of the therapeutic use of convalescent serum in guineapigs, and the author advocates its use for the treatment of human infections [see this *Bulletin*, 1936, Vol. 33, p. 696]. *E. H.*

Moise (R. M. Regolo). Ricerche epidemiologiche e sperimentali sulla trasmissione e patologia della febbre ricorrente in Somalia (1932–1937). [**Relapsing Fever in Somalia, 1932–37.**]—*Ann. di Med. Nav. e Colon.* 1938. July–Aug. Vol. 44. No. 7–8. pp. 315–327. With 2 plates, 7 charts & 4 figs.

Ornithodorus moubata has been regarded as the transmitter of relapsing fever in Abyssinia and Somaliland, but the author after a

fairly extensive examination has concluded that *O. savignyi* is present in large numbers, whereas *O. moubata* is relatively quite scarce, and that as far as concerns relapsing fever it is the former, *O. savignyi*, which is of epidemiological importance. *H. H. S.*

Avanessov (G. A.). [**Case of Spirochaetosis transmitted by Ticks in Afghanistan.**]—*Med. Parasit. & Parasitic Dis.* Moscow. 1938. Vol. 7. No. 1. [In Russian pp. 88–94. With 2 figs. French summary p. 94.]

In view of the absence of any previous records of relapsing fever transmitted by ticks in Afghanistan the author reports a number of cases in Europeans and Natives and describes the symptoms observed. These cases were associated with the finding of ticks of the genus *Ornithodorus*, the species of which has not yet been identified. Treatment with neosalvarsan was found to be effective only during the first days of the attack, but some cases proved to be refractory. In Afghanistan the incidence of tick fever is seasonal, with two peaks—at the beginning of summer and at the end of autumn.

C. A. Hoare.

Wheeler (Charles M.). **Progress of Spirochaete Infection in the Developmental Stages of the Host Tick, *Ornithodoros hermsi*, Wheeler.**—*Amer. Jl. Trop. Med.* 1938. July. Vol. 18. No. 4. pp. 413–419. With 3 charts. [10 refs.]

Details of experiments on the transmission of a Californian strain of spirochaetal relapsing fever by *Ornithodorus hermsi*.

The larvae hatching from eggs laid by infected ticks, five from Big Bear Lake and two from Lake Tahoe, were tested for the inheritance of infection by feeding both these larvae and the successive nymphal stages on white mice. Out of 672 larvae tested only 2 produced infection, but even this low percentage (0·29) is apparently sufficient to ensure its persistence.

In a further series of experiments clean larval ticks were fed on infected mice and subsequently the later developmental stages of the ticks were fed on normal mice and from 35 to 48 per cent. were found to transmit the infection. Moreover, clean larvae from a female taken at Lake Tahoe were infected with a strain of relapsing fever originating from a tick at Big Bear Lake. *E. H.*

Palmer (Lee). **Spirochetal Blood Stream Infection of Undetermined Type. Report of a Case.**—*Southern Med. Jl.* 1938. May. Vol. 31. No. 5. pp. 530–534. With 10 figs.

Details of a case of obscure spirochaetal infection in a 3-year-old boy in Louisville, Kentucky. The spirochaetes were found in the patient's blood by dark ground examination and also in a rat that had been inoculated 10 days previously with some of his blood.

The spirochaetes are said to be sluggishly motile, slender, about 15μ in length with three to five spirals, and were found on 12 to 14 occasions. The patient had 27 to 30 attacks of fever going up to 105–106°F., each lasting 2 to 10 days, with a 2 to 7-day interval between the bouts. The attacks were accompanied by the development of a rash resembling German measles, secondary lues, or rose-spots, but

except for this and malnutrition, physical examinations were entirely negative.

The condition failed to respond to 18 intravenous 0·2 gm. doses of neoarsphenamine, 12 doses of "Mapharsen," 0·015 gm. stovarsol, 15 injections of bismuth, and potassium iodide extending over a 10 months illness. Five months after the onset he developed pericarditis with effusion. *E. H.*

FENG (Lan-Chou) & CHUNG (Huei-Lan). **The Effect of Temperature on the Development of** *Spirochaeta duttoni* **in** *Ornithodorus moubata*.—*Chinese Med. Jl.* 1938. Mar. Supp. No. 2. pp. 555–562.

A continuation of the authors' previous paper on this subject [see this *Bulletin*, 1937, Vol. 34, p. 353], concerning the development of *Spirochaeta duttoni* in *Ornithodorus moubata*.

When the ticks were kept at 5° to 8°C., immediately after the infective meal, the spirochaetes remained alive in the stomach up to 63 days, and only a very small number passed through the stomach wall and reached the other organs of the body. By the 81st day all spirochaetes had disappeared from the ticks, and incubation at 25° to 30°C. did not restore their infectivity or bring about a reappearance of spirochaetes.

When the ticks were first incubated at 25° to 30°C. for about two months to ensure a well established infection, and then kept at 5° to 8°C., the spirochaetes did not disappear for at least 60 days, and the ticks produced infection when fed on susceptible animals.

The dissections of ticks kept at 25° to 30°C. up to 197 days after infection showed that spirochaetes invariably disappeared from the stomach contents by the 12th day, but remained present in the salivary glands, the reservoirs of the coxal glands and the nerve ganglia, which seem to be the best sites for their development. Spirochaetes were also found in the genital glands and occasionally in the Malpighian tubules. *E. H.*

JOYEUX (Ch.) & SAUTET (J.). Importance de la voie digestive pour la transmission du *Spirochaeta duttoni*. [**The Importance of the Alimentary Canal in the Transmission of** *Spirochaeta duttoni*.]—*Bull. Soc. Path. Exot.* 1938. Apr. 6. Vol. 31. No. 4. pp. 279–281.

Using a strain of *S. duttoni* from Brazzaville, the authors have fed normal rats with infected tissues with the object of testing the possibility of this method of transmission.

Infection was produced in rats by feeding them with the brains of rats infected respectively 15 and 21 days previously by inoculation, but when the brains (24) of rats that had been infected six months previously were used, no infection was produced by feeding. The ingestion of the viscera of infected rats also gave positive results.

The infections produced by feeding had a longer incubation period (10–14 days) than when infection was produced by *Ornithodorus*, and also the febrile reaction was much less severe, without relapses.

E. H.

L'Abbate (G.) & Mannino (S.). Sopra un caso di febbre ricorrente stabilitasi per contagio diretto. [**A Case of Relapsing Fever contracted by Direct Contagion.**]—*Arch. Ital. Sci. Med. Colon. e Parassit.* 1938. Aug. Vol. 19. No. 8. pp. 486–489.

One of the authors (Mannino) was taking blood from the finger of a patient at Gondar, Abyssinia, and during the process a few drops (possibly from a small artery) spurted into his nostril. The blood contained numerous spirochaetes in every field.

On the eighth day Mannino became feverish and the following day suffered from vomiting, diarrhoea, occipital headache, and generalized pains, his temperature being 40°C. A blood examination on the third day of fever showed scattered spirochaetes, small, delicate and feebly stained, very different from those seen in the original case and resembling the metacyclic forms described by Leishman in *O. moubata*.

Mannino is convinced that no opportunity for infection by vermin could have occurred, and the district in which he lived is not an endemic area. His symptoms were the same as those of his patient and, according to Brumpt, are characteristic of the tick-borne type. The authors therefore consider that the infection was acquired from the blood entering his nostril, and that it may have been facilitated by an unhealthy state of the mucous membrane due to rhinitis a little time previously. They discuss, and do not reject, the hypothesis that the spirochaetes thus directly transmitted might have undergone metacyclic development in his blood as they would have done in the body of a tick. *C. W.*

Chung (Hui-Lan) & Feng (Lan-Chou). **Studies on the Development of the Chinese Strain of** *Spirochaeta recurrentis* **in** *Cimex lectularius*. —*Chinese Med. Jl.* 1938. Mar. Supp. No. 2. pp. 563–577.

Bedbugs (*Cimex lectularius*) were fed on splenectomized squirrels, heavily infected with a Chinese strain of *Spirochaeta recurrentis*, and subsequently examined for the persistence of spirochaetes.

The gastric juice of the bedbug seems to have an adverse effect on *S. recurrentis*, for most of the spirochaetes were dead in 24 hours and only occasionally a few survived for two days.

Spirochaetes may be found in the legs and coelomic fluid within one and a half hours of an infective meal, but they often succumb without further development and the longest period they were found to survive was twelve days. On one occasion a single spirochaete was found in the nerve ganglia, but the Malpighian tubules and salivary glands were invariably negative.

Three splenectomized normal squirrels were each bitten by more than 60 bedbugs containing spirochaetes, without being infected. Moreover, the eggs and nymphs derived from infected bedbugs contained no spirochaetes and were not infectious. *E. H.*

Ts'un (T'ung) & Chung (Huei Lan). **The Kolmer's Wassermann, Kahn and Kline Tests in Relapsing Fever.**—*Chinese Med. Jl.* 1938. Mar. Supp. No. 2. pp. 315–324. [14 refs.]

A total of 238 specimens of sera from 88 cases of Chinese relapsing fever at the Peiping Union Medical College were subjected to various

tests: 102 to Kolmer's Wassermann, Kahn and Kline tests simultaneously; 18 to the first two of these tests; 114 to Kolmer's Wassermann and Kline tests; and 4 to Kolmer's Wassermann test alone. The results show that the sera of seven patients gave positive reactions considered to be due to relapsing fever, but only in a transient and irregular manner. Sera of 29 cases, in which concurrent syphilitic infection was present, were consistently positive.

Although 7·95 per cent. of the relapsing fever patients gave false positive reactions with these various tests, the transient and irregular appearance of these reactions readily distinguished them from the positive reactions observed in syphilis. *E. H.*

Brussin (A. M.) & Sternberg (E. J.). Ueber die Bedeutung des retikuloendothelialen Apparates bei Infektionskrankheiten. XV. Die immunisatorische Funktion des Retikuloendothelial-systems beim Rückfallfieber. [**The Significance of the Reticulo-endothelial System in Infectious Diseases. XV. The Immunizing Function of the Reticulo-Endothelial System in Relapsing Fever.**]—*Giorn. di Batteriol. e Immunol.* 1938. July. Vol. 21. No. 1. pp. 46–62. With 1 chart. [31 refs.] English summary (4 lines.)

An account of experiments supporting the view that the reticulo-endothelial system is the source of antibodies against *Spirochaeta recurrentis* and *Trypanosoma equiperdum*. Quantitative estimations were made of the titre of the immune bodies in the blood of infected mice with the R.E.S. intact, and in others with this system blockaded.

Advantage was taken of the fact that when mice infected with *S. recurrentis* are injected with neosalvarsan, the destruction of the spirochaetes in the tissues is followed by a very marked production of antibodies. Accordingly normal mice, and others splenectomized one day previously, were each injected with a dose of 0·5 cc. of a 1 : 400 solution of neosalvarsan per gramme body weight, followed 30 to 60 minutes later by an intraperitoneal inoculation of 0·02 cc. blood containing 1–2 spirochaetes (*S. duttoni*) per field. The titre of antibodies against the spirochaetes in these mice was estimated by means of the adhesion test (depending on the thrombocytobarin content), and in the case of normal mice the titre rose to 3,800 by the sixth day and after reaching 4,000 on the eighth fell to about 1,000 on the tenth day and then to a level of about 200. In the case of the splenectomized mice, however, the titre only rose to a maximum of about 300 by the tenth day and then dropped to below 100. Similar results were obtained with splenectomized mice that in addition had had the R.E.S. blockaded by injections of sugar of iron, but in this series the dose of neosalvarsan was increased to 0·5 cc. of a 1 : 100 solution per gramme body weight.

The immunizing function of the spleen, however, is gradually replaced by the compensatory action of the remaining reticulo-endothelial tissue, the rate at which this occurs depending on the nature of the antigen.

By injection with neosalvarsan previous to the inoculation of the organisms, it is possible to immunize an animal against the spirochaetes of relapsing fever, without the development of a latent infection; by diminishing this previous dose of neosalvarsan, however, although infection is not prevented, the course of the disease can be varied, since the duration of the latent period is lengthened.

In mice the antibody formation against spirochaetes is much stronger than against trypanosomes. The authors' experiments support the view that it is only by making comparative quantitative estimations of the antibody titre in animals that had received a previous injection of neosalvarsan, that it is possible to follow the differences between normal, splenectomized, and splenectomized and blockaded animals, respectively. If the infections had been allowed to develop normally, it would not have been possible to observe the differences in antibody formation. *E. H.*

Brussin (A. M.) & Sternberg (E. J.). Ueber den Einfluss der Salvarsanpräparate auf die Antikörperbildung beim Rückfallfieber. [**The Effect of Salvarsan Preparations on Antibody Production in Relapsing Fever.**]—*Giorn. di Batteriol. e Immunol.* 1938. Aug. Vol. 21. No. 2. pp. 207–225. With 2 charts. [19 refs.]

Working with relapsing fever infection in mice the authors studied the development of antibodies by the thrombocytobarin reaction. They found that the earlier salvarsan was given, the slower was the development of antibodies. The spirochaetes that were killed by the salvarsan apparently acted as vaccines, but their immunizing power did not seem to differ from that of spirochaetes succumbing to the natural defences of the body. No evidence was obtained to suggest that salvarsan stimulated the antibody-forming mechanism, and its chief value therefore lies in its power of destroying the spirochaetes directly. *G. S. Wilson.*

LEPTOSPIROSIS.

Précis of Abstracts in this Section.

Das Gupta (p. 114) records five further cases in Calcutta occurring sporadically and not associated with any common conditions. Infection in rats is rare in Calcutta. The organisms isolated belonged serologically to the *L. icterohaemorrhagiae* group. Vaucel (p. 114) summarizes observations in Indo-China, describing the well marked serological types found. Glotzer (p. 115) records infection by *L. icterohaemorrhagiae* in a fish cutter in New York and raises the question of the inclusion of this disease among those counted as occupational hazards. He stresses the importance of bearing in mind Weil's disease in waterfront cities. Kaufmann (p. 115) shows the general agreement in the serological reactions of strains of leptospira of Weil's disease, and the distinctive differences between them and *L. canicola*. Esseveld and Mochtar (p. 115) describe *L. javanica* isolated from field rats in Java. It differs from all the strains with which it was compared, and is not definitely pathogenic for guineapigs. A single rat strain in Java was found to be identical with the "Salinem" strain which causes leptospirosis in Sumatra. Johnson (p. 116) describes eight cases of mild disease in Queensland caused by the Pomona type of leptospira, which is serologically distinct from *L. icterohaemorrhagiae*. The epidemic occurred probably as a result

of heavy rain, as a consequence of which rural workers are brought into contact with mud and water which, if infected, may retain the living organism for a considerable period. WALCH-SORGDRAGER, BOHLANDER and SCHÜFFNER (p. 116) describe the peculiarities of the disease in three districts of Queensland. In Ingham, two strains were found, "Ballico" (a new strain) and "Zanoni," and in Pomona a hitherto undescribed strain. The authors propose the name *L. australis B.* for the Zanoni strain until it is decided whether or not it belongs to the Salinem group. SEFTON (p. 117) describes the appearance of acute yellow atrophy in the liver of a patient in Brazil. *L. icterohaemorrhagiae* was obtained in preparations of the liver, and it may be that from a similar case NOGUCHI isolated his "*L. icteroides*." VAN DER WALLE (p. 117) found positive reactions to *L. icterohaemorrhagiae* in 15, and to *L. canicola* in 29 of 100 dogs in Antwerp.

C. W.

DAS GUPTA (B. M.). **Leptospirosis in India.**—*Indian Med. Gaz.* 1938. Aug. Vol. 73. No. 8. pp. 449–453. [11 refs.]

A description of five more cases (three fatal) of leptospirosis in Calcutta, from one of which the causal organism was isolated, the remaining four being diagnosed by agglutination and other tests. Including one previously described [see this *Bulletin*, 1938, Vol. 35, p. 129], six cases have been seen within the past eight months. The infecting organism belongs to the same serological group as the typical *L. icterohaemorrhagiae*, but the two strains isolated could be differentiated by protection tests.

The most curious feature of these cases is their epidemiology, for they occurred sporadically in different quarters of the city, and were not associated with river bathing, polluted water, or any particular occupation. Moreover, the incidence of this infection in the rat population of Calcutta is extremely low. KNOWLES, in 1928, found none infected out of 180 rats examined, and Knowles and Das Gupta (1932), 2 out of 193. Recently 162 rats (mainly *Nesokia bengalensis*) were examined, and in addition twenty rat sera were tested for agglutination reaction with human strains, with completely negative results.

E. Hindle.

VAUCEL (M.). Contribution à l'étude des leptospiroses. Résultats acquis en Indochine. [**A Contribution to the Study of Leptospiroses. Results aequired in Indo-China.**]—*Arch. Insts. Pasteur d'Indochine*. 1937. Oct. Vol. 7. No. 26. pp. 137–176. With 7 charts. [73 refs.]

A useful summary of observations on leptospiral infections in Indo-China, from which the author concludes that it is not practicable to divide them into different species on the results of agglutination reactions.

On the other hand there are well marked serological types which all seem to belong to the *L. icterohaemorrhagiae* group. These types seem comparatively rare in Europe (*L. icterohaemorrhagiae*, *L. grippotyphosa* and *L. canicola*, and similarly only three have been noted in Japan *L. icterohaemorrhagiae*, *L. autumnalis* and *L. hebdomadis*). The three Japanese types are all found in the Netherlands Indies, the Malay archipelago, and Indo-China, but in these countries other

types are found which may possibly be intermediate forms. Of especial interest are the two strains "Kebler" and "Tuyên-Quang" isolated in Tonking, which are very well marked and distinct types [see this *Bulletin*, 1937, Vol. 34, p. 706].

An extensive bibliography of the subject is given, including a section devoted to leptospiroses in Indo-China. *E. H.*

GLOTZER (Solomon). **Weil's Disease. Report of a Case in a Fish Worker.**—*Jl. Amer. Med. Assoc.* 1938. June 25. Vol. 110. No. 26. pp. 2143–2145.

The record of a typical case of infection with *S.* (*Leptospira*) *icterohaemorrhagiae* in a fish cutter in New York City. This is the twenty-first reported case in the U.S.A. and the second among fish workers. The author raises the question of its inclusion in the list of diseases accepted as occupational hazards, for the disease is obviously liable to occur in types of work in which the individual is exposed to contact with rat excreta.

Weil's disease must also be considered in the differential diagnosis of jaundice, especially in a waterfront city such as New York, where rat infestation is present. *E. H.*

KAUFMANN (Otto). Vergleichende serologische Untersuchungen mit verschiedenen Stämmen der *Spirochaeta icterogenes* und mit der *Spirochaeta canicola*. [**A Comparative Serological Investigation of Various Strains of** *Spirochaeta icterogenes* [*L. icterohaemorrhagiae*] **and** *S.* [*L.*] *canicola*.]—*Ztschr. f. Immunitätsf. u. Experim Therap.* 1938. July 8. Vol. 93. No. 3/4. pp. 354–367. With 1 chart. [28 refs.]

The author examined the serological reactions of 45 positive Weil sera, preserved at the Hamburg Hygienic State Institute, to three Weil strains—"U," "Lisbon," and "R104"—and a strain of *L. canicola*. Complement fixation, agglutination and flocculation tests were performed with each serum, and the results confirm the view that although Weil strains show considerable variation, there is a general agreement in their serological reactions. *L. canicola*, on the other hand, possesses well-marked distinctive characters separating it from *L. icterohaemorrhagiae*. *E. H.*

ESSEVELD (H.) & MOCHTAR (A.). Over het voorkomen van een nieuw leptospira-type (*L. javanica*) en het "Salinem-type" bij veldratten op Java. [**A New Leptospira-type** (*L. javanica*) **and the "Salinem-Type" in Field Rats of Java.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1938. June 21. Vol. 78. No. 25. pp. 1513–1522. [29 refs.] German summary. [Summary appears also in *Bulletin of Hygiene*.]

SARDJITO, Mochtar and WIRASMO were able to cultivate leptospirae from 21 per cent. of field rats caught in mid-Java. Twelve of those leptospira strains are now made the subject of comparative serological test by the agglutination-lysis technique. High-titre sera of nine known strains were used: Wijnberg (*L. icterohaemorrhagiae* from Holland), Swart, Tachmat, Salinem, Roesel (*L. canicola*), Moscow (*L. grippo-typhosa*), Hebdomadis (Japan 7-day fever), Pomona (Australian) and Ballico (Australian). Eleven out of the twelve belonged to one type and differed from all of the test strains. They

were not definitely pathogenic for guineapigs and the strain was named *L. javanica*. It has not yet been possible to compare this strain with *L. akiyami* which, however, is markedly virulent for guineapigs and has as its reservoir an Apodemus-species, not a rat species. Apparently the field rats in the vicinity of Batavia have also been found to be infected with *L. javanica* and even cats have shown spontaneously acquired infection. It remains to determine whether this new organism is pathogenic for man, in view of the importance of wet rice culture for Java.

The remaining 12th strain, R.A.148, was identified with the "Salinem" patient strain, the cause of leptospirosis in Sumatra. It is obviously desirable that investigation as to the existence of this leptospirosis in Java should be made and also whether the field rats of Sumatra are infected. *W. F. Harvey.*

JOHNSON (D. W.). **Mild Leptospirosis in Southern Queensland: a Classification of the Infecting Leptospira, and a Report of Eight Further Cases of the Disease.**—*Med. Jl. Australia.* 1938. May 7. 25th Year. Vol. 1. No. 19. pp. 805–813. With 6 figs.

A clinical description of eight cases of mild leptospirosis in Southern Queensland, caused by the Pomona type of leptospira, which is serologically distinct from *L. icterohaemorrhagiae*, and seems to be a new type. The outstanding clinical features were fever, prostration, severe headache and generalized muscular pains. Delirium and conjunctival congestion were also noted in several cases. The duration of the fever was 3 to 8 days. Jaundice was not observed and there were no deaths. Two patients suffered from pain and swelling in the joints; one had a typhus-like rash and another became temporarily blind some two weeks after apparent recovery.

The epidemic at Beaudesert is considered to have arisen as a result of heavy rain as all 7 cases developed 7 to 15 days from the last day on which this occurred. The other case, at Pomona, similarly occurred 10 days after very heavy rain. For a few days after a heavy fall the rural population would be working in close association with mud and water. The water from a creek in this neighbourhood, with a *p*H of 7·1, was mixed with pathogenic leptospirae of the Pomona type and the organisms persisted in the water for 33 days at room temperature (6°–24°C.). *E. H.*

WALCH-SORGDRAGER (B.), BOHLANDER (L.) & SCHÜFFNER (W. A. P.). Over leptospirosis in Australië en eenige opmerkingen over de soortbepaling der daar geïsoleerde stammen. [**Leptospirosis in Australia. Remarks on the Strains isolated there.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1938. Sept. 20. Vol. 78. No. 38. pp. 2299–2308. English summary. [Summary appears also in *Bulletin of Hygiene.*]

Cases of leptospirosis were reported from three districts, Ingham, Pomona and Brisbane, all in Queensland. The disease presents certain peculiarities in these districts. In Ingham it is found mostly among cane-cutters; the severity varies, in some cases quite mild, in others severe and even fatal; jaundice does not occur in all. Two strains of leptospira were found; "Ballico," a new strain, and "Zanoni," possibly distinct from, though showing certain co-reactions with, the Salinem group. Both were found in local rats. In Pomona,

a hitherto undescribed strain was isolated ; it sets up a mild fever lasting for a week and cases are seen every year. In Brisbane, of three cases recorded, one—ending fatally—was contracted in N. Queensland, the other two were sewer-workers in the town and clinically were typical instances of *icterohaemorrhagiae* infections.

The authors discuss some of the difficulties in classifying the Zanoni strain and until a decision is reached as to whether it belongs to the Salinem group or not they propose the name *L. australis B. H. H. S.*

SEFTON (Basil). Espirochetose ictero-hemorragica. Subsidio aos estudos feitos no Brasil. [**A Case of Weil's Disease.**]—*Brasil-Medico.* 1938. Apr. 16. Vol. 52. No. 16. pp. 379–384. With 1 fig. [66 refs.] [Summary appears also in *Bulletin of Hygiene.*]

A man of 19 years of age when first seen by the author was suffering from headache, loss of appetite, dyspepsia, slow pulse and was slightly jaundiced. Nine days later when again seen he was deeply jaundiced, vomiting, very weak and prostrated and clutching at his head. Death took place a few hours afterwards. At autopsy the liver showed the lesions of acute yellow atrophy. *L. icterohaemorrhagiae* was obtained in preparations and smears from the liver. [The interest of this case lies in the fact that it was probably in such a case as this that NOGUCHI first isolated his "*L. icteroides*" and was thus led to regard the organism as the cause of yellow fever.] *H. H. S.*

VAN DER WALLE (N.). Recherches sur l'existence d'infections à leptospires chez les chiens à Anvers. [**Investigations into the Presence of Leptospiral Infections in the Dogs of Antwerp.**]—*C. R. Soc. Biol.* 1938. Vol. 128. No. 21. pp. 804–806.

The results of the author's examination of the blood of 100 dogs in Antwerp are shown in the following table :—

No. of sera examined	Negative	Positive	Species of Leptospira	
			L. ictero-haemorrhagiae	*L. canicola*
Male 62 ...	31	31	7	24
Female 38 ...	25	13	8	5
Total 100 ...	56	44	15	29

Cultures were made from the kidneys of these animals ; 13 were contaminated, 86 remained sterile, and only one tube showed a culture of leptospira after an incubation period of about three weeks. This organism had a low virulence for guineapigs and in its serological reactions agreed with *L. canicola*. The serum of the dog from which this strain was isolated showed no signs of illness, but its serum produced lysis of *L. canicola* in dilutions of 1 : 300, and *L. ictero-haemorrhagiae* in dilutions of 1 : 10. *E. H.*

BLACKWATER FEVER.

Précis of Abstracts in this Section.

Fairley (p. 118) gives a résumé of the present state of knowledge of the visceral, plasma, biliary and faecal, and urinary pigments in blackwater fever, with special mention of pseudomethaemoglobin. Fairley and Bromfield (p. 120) show that this pigment was found in the fluid from a pancreatic cyst and demonstrated on a Hartridge reversion spectroscope. It can therefore be found outside the vascular system when blood escapes into a cavity, is haemolysed and subsequently mixed with plasma or serous exudate. They describe methods of producing it artificially.

Foy and Kondi (p. 121) in Greece confirm the occurrence of pseudomethaemoglobin in the plasma and serum of blackwater fever patients, as described by Fairley. Methaemoglobin is found in the urine but never in the serum in Greece. They discuss anuria and show that plasma albumin, globulin and fibrin fall within normal limits. The same authors (p. 122) found methaemoglobin, but not pseudomethaemoglobin, in the blood of a patient with cyanosis resulting from plasmoquine. The methaemoglobin was intracorpuscular and never appeared in the serum, which contrasts with the pseudomethaemoglobin of blackwater fever, which is always free in the serum.

Jordan (p. 123) concluded, from an investigation of a patient with nocturnal haemoglobinuria, that the haemolysis was due to an abnormal state of the red cells. The sensibilization of these appeared to be periodic.

Huber, Florand, Lièvre and Néret (p. 123) describe a boy of 4 years with the extremely rare condition of the passage of myohaematin in the urine associated with slight fever, jaundice and pains in the legs. There was no appreciable destruction of red cells.

Parisi (p. 124) saw 5 patients with blackwater fever in a total of 1,800 European soldiers treated for malaria in one year in East Africa. All had *falciparum* infections and recovered under treatment by atebrin (presumably the musonate). Trapani-Angileri (p. 124) treated a patient with *Surrenasi* intravenously after the method of Ascoli. The patient recovered. *C. W.*

Fairley (N. Hamilton). **Blood Pigment Metabolism in Blackwater Fever.**—Reprinted from *Festschrift Bernhard Nocht z. 80. Geburtstag von seinen Freunden u. Schülern. Hamburg.* 1937. pp. 123–130. [20 refs.]

In this short review the author deals with the phenomena resulting from intravascular haemolysis in blackwater fever, but, as he points out, the mechanism by which the haemolysis is produced still remains to be solved.

After summarizing briefly the chief phenomena—clinical and pathological—associated with intravascular haemolysis, Fairley considers in turn the various pigments—visceral, plasma, biliary and faecal, and urinary—found in blackwater fever. There is nothing new in the article, but it gives an excellent résumé of the present state of knowledge.

Visceral pigments.—These consist of malaria pigment or haemozoin, and haemosiderin. The former, which is similar to, if not identical

with, haematin, is found in the cells of the reticulo-endothelial system and occurs as brownish-black granules, or clumps of black pigment, and does not give the Prussian blue reaction. In blackwater fever it is found in small amounts, but apart from malaria it is seen in the liver in only one other disease, schistosomiasis, in which disease it is formed from partly digested blood regurgitated into the portal vein by the worms. Haemosiderin occurs normally as a fine brown pigment in the parenchyma cells of the liver, spleen and kidneys; it is greatly increased in amount in blackwater fever and other diseases in which blood destruction is considerable. It contains 17 per cent. of iron and gives the Prussian blue reaction.

Plasma pigments.—These are oxyhaemoglobin, pseudomethaemoglobin and bilirubin. The existence of oxyhaemoglobinaemia in blackwater fever has been recognized by the reviewer and his colleagues and by numerous other observers for many years. In view of the massive blood destruction in blackwater, the amount of haemoglobin free in the plasma is very small as compared with diseases like *Babesia* infection. The explanation of this phenomenon is still obscure.

Methaemoglobin was first recorded in the blood of blackwater fever cases by Barratt & Yorke (1909) and has since been observed by a number of workers. Fairley and Bromfield (1934) [this *Bulletin*, 1935, Vol. 32, p. 210] reported a new pigment closely allied to methaemoglobin in the plasma of a patient with blackwater, and in 1937 found that it was present in all the more severe cases investigated in Macedonia [this *Bulletin*, 1937, Vol. 34, p. 841]; they showed that this pigment had been erroneously regarded as methaemoglobin by all previous workers and named it pseudomethaemoglobin. The new pigment originates from extracorpuscular haemoglobin, its maximum concentration is attained later than that of oxyhaemoglobin, and in fatal cases its concentration often rises progressively until death. Pseudomethaemoglobin cannot function as a respiratory pigment, it is never found within the red corpuscles nor in the urine.

It was found experimentally that human plasma (normal as well as blackwater) converts extracorpuscular haemoglobin into pseudomethaemoglobin; and it was also found that when methaemoglobin, sulphaemoglobin, haematin, or an alkaline solution of a pure haemin was incubated with plasma at 40°C. pseudomethaemoglobin was formed. As a result of these observations, Fairley and Bromfield concluded:—

> That there are two stages in the formation of pseudo-methaemoglobin in man, firstly, the production of globin and haematin or haem from extracorpuscular blood pigment, and, secondly, the combination of haematin or haem with some nitrogen-containing substance in the plasma to form a compound—pseudo-methaemoglobin—which on reduction with sodium hydrosulphite gives a haemochromogen having a different spectrum to globin-haemochromogen. The nature of the nitrogen-containing constituent is still being investigated.

Hyperbilirubinaemia occurs in all severe cases of blackwater and may persist after haemoglobinaemia has disappeared.

Biliary and faecal pigments.—Clinically there is abundant evidence that an increased quantity of bile reaches the duodenum in blackwater fever, since the stools are of bilious type and bilious vomiting is characteristic. This pleocholia is, of course, a direct consequence of the increase of haemobilirubin resulting from intravascular haemolysis. Fairley and Bromfield (1934) examined the bilirubin content of

blackwater fever bile and recorded values up to 4,900 units (2·45 per cent.). These results tally with the experimental observations of Barratt and Yorke (1914) [this *Bulletin*, 1915, Vol. 5, p. 254], who found that for 3 to 4 hours following the intravenous injection of rabbits with their own haemoglobin, the amount of pigment in the bile was increased by four to six times.

Urinary pigments.—Those of special interest are oxyhaemoglobin, methaemoglobin, urobilin and a brown pigment found as a deposit in blackwater urine and generally regarded as acid haematin. The last is responsible for blockage of the renal tubules ; it requires further investigation for it has not the solubilities of artificially produced acid haematin, and owing to its insolubility is very difficult to investigate spectroscopically. The quantity of oxyhaemoglobin in the urine varies considerably in different cases, but, according to Yorke and his colleagues, even in the most severe cases of blackwater fever, never more than 10 per cent. of the extra-corpuscular haemoglobin is excreted in this way. Physiologists think that extracorpuscular haemoglobin is filtered through the glomerulus of the kidney, but Yorke and Nauss (1911) consider that haemoglobin is secreted by the epithelial cells of the convoluted tubules, which are damaged in the process and undergo degenerative changes.

Methaemoglobin is responsible for the black discolouration of blackwater fever urine, and its incidence varies with the reaction of the urine, and the interval between the excretion of the urine and its examination. *W. Yorke.*

Fairley (N. Hamilton) & Bromfield (R. J.). **I. Pseudo-Methaemoglobin—its Demonstration in Pancreatic Cyst Fluid. II. Artificial Production of Pseudo-Methaemoglobin.** [Demonstration.]—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1938. Jan. 25. Vol. 31. No. 4. pp. 374–376.

Pseudomethaemoglobin, occurring naturally in pancreatic cyst fluid, as well as that produced artificially, was demonstrated on a Hartridge reversion spectroscope.

The pancreatic cyst yielded over 3 litres of dark brown turbid fluid, which was just alkaline to litmus, and contained albumin and diastase, but no bile salts or pigments. The benzidine test was positive and an occasional red cell and leucocyte were found in the deposit. The authors have previously shown that pseudomethaemoglobin is produced in severe intravascular haemolysis ; the present finding shows that it may also be produced outside the vascular system when blood escapes into a cavity, is haemolysed and subsequently mixed with plasma or serous exudate.

Pseudomethaemoglobin was produced artificially :—

(*a*) By incubating solutions of oxyhaemoglobin with plasma derived from certain animal species. When one volume of a strong solution of oxyhaemoglobin obtained from man or the following monkeys—*Macacus rhesus*, *M. iris* or *Cercopithecus aethiopis*—was incubated at 40°C. with three volumes of human or monkey plasma, pseudomethaemoglobin was produced within two or three days. When, however, solutions of haemoglobin were incubated with plasma from the rabbit, guineapig or rat, pseudomethaemoglobin was not produced, although methaemoglobin sometimes appeared. Control solutions of

oxyhaemoglobin from all species readily produced methaemoglobin when incubated alone for 12 to 24 hours.

(*b*) By adding alkaline haematin to plasma derived from certain animal species. Alkaline haematin was prepared by adding pure haemin to water made alkaline with two or three drops of a 10 per cent. solution of sodium hydroxide. This was then added to plasma from man, *Macacus* spp., *Cercopithecus* sp. and from certain other animals, *e.g.*, rabbit and guineapig. With human and monkey plasma pseudo-methaemoglobin was immediately produced, but this was not the case with the plasma from other animals.

There can be little doubt that pseudomethaemoglobin is a by-product of haemoglobin katabolism, and is formed both *in vivo* and *in vitro* by the union of haematin with some protein or other nitrogenous constituent of human and simian plasma. *W. Y.*

FOY (Henry) & KONDI (Athena). **Spectrographic Analysis of Pigments in Serum and Urine of Blackwater Fever.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1938. June 25. Vol. 32. No. 1. pp. 49–65. With 6 figs. [26 refs.]

In view of the discovery by FAIRLEY and BROMFIELD of a new pigment (pseudomethaemoglobin) in the plasma and serum of blackwater fever patients, the authors have made a spectrographic analysis of all cases of this disease entering the Refugee Hospital during 1936 and 1937; they have also re-examined spectrograms taken in 1934 and 1938, and are able to confirm the existence of a pigment having its absorption maximum in the red at 622 and 624 $m\mu$. The present paper is concerned entirely with the qualitative aspect of the work in the visible region of the spectrum. The extinct coefficient of pseudomethaemoglobin cannot be obtained at present, since no known concentration of this pigment has yet been made, and consequently no accurate qualitative work is possible. Some idea of a relative concentration of the pigment in different bloods is, however, obtainable by spectroscopic dilution, and this method has been used in the present work.

The authors give the following extended summary of their results and conclusions :—

" 1. Pseudo-methaemoglobin has been confirmed as a new pigment present in the vast majority of cases of blackwater fever in Greece.

" 2. This pigment has its absorption maximum of the band in the red at a point that varies between 622 and 624 $m\mu$, thus occupying a position intermediate between sulphaemoglobin (618 $m\mu$) and methaemoglobin (630 $m\mu$).

" 3. To represent the series of changes that are taking place in cases of blackwater fever, spectrograms are given showing the absorption band of blood containing (*a*) pseudo-methaemoglobin, oxyhaemoglobin and bilirubin; (*b*) pseudo-methaemoglobin and bilirubin.

" 4. To show the shift in the band of the three pigments, spectrograms are given comparing the absorption maximum of the band in the red of pseudo-methaemoglobin, methaemoglobin and sulphaemoglobin.

" 5. A spectrogram of urine in a case of blackwater fever containing methaemoglobin is given to emphasize that methaemoglobin with its absorption band at 630$m\mu$ is the pigment present in urine.

" 6. The presence of methaemoglobin in urine is not directly related to the presence of pseudo-methaemoglobin in blood.

" 7. Methaemoglobin in the urine is present in the bladder, as shown by catheterization, carried out four hourly, thus indicating that the formation of methaemoglobin in urine takes place higher up in the renal system than

the urinary bladder. Methaemoglobin when present in the urine is converted into sulphaemoglobin on the addition of 10 per cent. yellow ammonium sulphide.

" 8. Methaemoglobin has been found to occur in urine when pH varies between 5 and 9 as taken potentiometrically.

" 9. Urines which contain no methaemoglobin when passed do not develop it on standing at laboratory temperatures for long periods (up to two weeks).

" 10. Considerable difficulty was found in correlating the degree of anuria with the amount of blood destruction and the pH of the urine, and it is suggested that colligative changes in the blood, incident upon the liberation of large amounts of haemoglobin, may not be an unimportant factor in the genesis of anuria, in addition to the blockage of the renal tubules with haemoglobin. Estimations of the depression in the freezing point of serum (Δ) from anuric cases of blackwater fever would tend to support this view.

" 11. Estimation of plasma albumin, globulin and fibrin in blackwater fever indicate that these fall within normal range ; although the averages differ from normal averages, being somewhat lower in the case of total proteins and albumin, and raised in the globulin and fibrin. The $\frac{A}{G}$ ratio was sometimes markedly below normal.

" 12. Methaemoglobin has never been found in blackwater serum in Greece.

" 13. The magnitude and suddenness of the haemolysis is not the only factor determining the concentration of pseudo-methaemoglobin in blood, as shown by cases where great haemolysis has taken place ; yet the concentration of pseudo-methaemoglobin is often less than in cases when the haemolysis has been considerably lighter."

W. Y.

Foy (Henry) & Kondi (Athena). **A Note on Intracorpuscular Methaemoglobin in Plasmochin Toxicity.**—*Ann. Trop. Med. & Parasit.* 1938. Oct. 12. Vol. 32. No. 3. pp. 249–256. With 2 plates.

In view of the constant occurrence of pseudomethaemoglobin in blackwater fever in Macedonia, the authors have inquired whether the pigment found in cases of plasmoquine intoxication, and in the blackwater said to follow the administration of plasmoquine, was methaemoglobin or pseudomethaemoglobin.

The cyanosis characteristic of plasmoquine poisoning has always been attributed to the presence of intracorpuscular methaemoglobin, giving rise to a prominent absorption band in the region of the spectrum above 600 mμ. As, however, a similar band in blackwater fever had been erroneously described as methaemoglobin, it seemed desirable to ascertain the exact nature of the substance which produces the absorption band in the red in cases of plasmoquine poisoning.

The authors state that they have rarely seen an unquestioned case of cyanosis accompanied by the presence of abnormal pigments in the blood-stream in cases treated with normal doses of atebrin and plasmoquine [atebrin 0·3 gm. plus plasmoquine 0·03 gm. daily for five days.] Recently, however, such a case was encountered ; the patient developed marked cyanosis, and abnormal pigments were found in the blood-stream. Full details of the case are given and also the following summary of the observations :—

" 1. Methaemoglobin, and not pseudo-methaemoglobin, has been found spectroscopically to be the pigment present in the circulating blood in cases of plasmochin toxicity.

" 2. This methaemoglobin is intracorpuscular, and never appears at any time in the serum. This is in sharp contrast to the pseudo-methaemoglobin that occurs in blackwater fever, which is always free in the serum.

" 3. Whether, in cases of blackwater fever said to be provoked by plasmochin, the methaemoglobin is present free in the serum as a consequence of the haemolysis, is at the moment impossible to say. It is not impossible that, once the methaemoglobin has been liberated from the red cells, it may be converted into pseudo-methaemoglobin.

" 4. The supernatant fluid from the lysed cells of the case of plasmochin toxicity incubated with serum at 37°C. formed pseudo-methaemoglobin, but this is not unusual, since weak solution of haemoglobin incubated with serum will also form pseudo-methaemoglobin."

W. Y.

JORDAN (F. L. J.). Etudes sur l'hémoglobinuric. [**Studies in Haemoglobinuria.**]—*Acta Med. Scandinavica.* 1938. Vol. 95. No. 2–4. pp. 319–340. With 1 chart. [59 refs.]

The author has studied two typical cases of haemoglobinuria *ex frigore* and a case with an atypical haemoglobinuria, resembling in many respects the nocturnal haemoglobinuria of ENNEKING. The last case was that of a girl of 25 years of age, who had suffered from many attacks since December 1928. The urines passed after midnight and during the early morning were chiefly affected. The attacks were never precipitated by cold, as in the case of haemoglobinuria *ex frigore*. There was no evidence of syphilis, and the Wassermann and other reactions were negative.

In the case of nocturnal haemoglobinuria, examination of the serum of the patient showed nothing abnormal, and the haemolysis appeared to be due to an abnormal state of the red cells themselves. In both classes of case the haemolysis is activated by carbonic acid. In the case of nocturnal haemoglobinuria the sensibilization of the eythrocytes appeared to be the subject of periodic oscillations. Cholesterin had no effect on the haemolysis. *W. Y.*

HUBER (Julien), FLORAND (J.), LIÈVRE (J. A.) & NÉRET. Crises myopathiques paroxystiques avec hémoglobinurie. [**Paroxysmal Myopathic Crises with Haemoglobinuria.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1938. May 9. 54th Year. 3rd Ser. No. 15. pp. 725–728.

A detailed clinical account is given of the case of a boy, four years old, who was brought to the author's clinic with a painful spasm of the muscles of the legs, associated with fever. The child was perfectly well until 30th January, 1938, when after a short walk he appeared to be fatigued and to have lost his appetite. The following morning he complained of pains in the right foot. On 1st February the pains had extended all over the right leg and the child walked with difficulty ; on 2nd February both legs were involved and the child was unable to walk, and on 3rd February he passed urine containing haemoglobin. When first seen by the authors on 4th February, the temperature was 38·3°C., the pulse 160, and there was slight jaundice. The lower portion of the body, and especially the legs, were very hyperaesthetic, and the child could not raise the heels from the bed. The muscles of the legs and the lumbar region were rigid, in a state of contraction, and very painful. The condition gradually disappeared and by the end of February he was apparently well.

This condition, which is extremely rare in man, is fairly common in horses. The pigment appearing in the urine is of muscular origin and is known as myohaematin. In the present case there was no appreciable destruction of red cells, the red cell resistance was normal, the Donath and Landsteiner reaction was negative, as was also Ehrlich's test. In all, only 4 or 5 human cases have been recorded. *W. Y.*

PARISI (Ennio). Sull'emoglobinuria nei malarici e il suo trattamento terapeutico con atebrin. [**Blackwater Fever treated by Atebrin.**]—*Giorn. Ital. di Clin. Trop.* 1937. Sept. 30. Vol. 1. N. S. No. 9. pp. 270–71, 273–6, 279–80.

Five cases are reported occurring in Italian Somaliland among European soldiers. In every one *P. falciparum* was seen in the blood; all had taken quinine but not always very regularly. One stated that he had taken 0·4 gm. (6 grains) daily of the hydrochloride since his coming to the country. These five were the only cases seen among 1,800 malarial patients during the twelve months December 1935–November 1936, and the author suggests that an individual predisposition should be postulated, or "some other element which up to the present has escaped our observation" [neither suggestion is very helpful]. All these patients were given atebrin with good result. [The dosage employed is not stated, but in the course of his preliminary remarks the author mentions that the musonate injected intramuscularly thrice daily in doses of 12·5 cgm. in 3 cc. water has been recommended; in the absence of any other statement it is to be presumed that this was the plan he adopted.] *H. H. S.*

TRAPANI-ANGILERI (Rocco). Un caso di febbre ittero-emoglobinurica da malaria trattato con la cura di Maurizio Ascoli. [**Case of Malarial Haemoglobinuria treated by Ascoli's Method.**]—*Riv. Sanitaria Siciliana.* 1937. Oct. 15. Vol. 25. No. 20. pp. 1179–80, 1183. [41 refs.]

A peasant, aged 18, who had always lived in a malarious locality and who had suffered from attacks of malaria in the past had irregular fever for a week during which he was treated with small doses of quinine. He suddenly became acutely ill with a temperature of 104·9°F. vomiting and diarrhoea. He became intensely jaundiced and passed blood-stained urine. He was given 1 gm. of quinine a day for four days and at the same time Ascoli's method of treatment was begun. After the first intravenous injection of *Surrenasi* the haemoglobinuria ceased; after the third injection the temperature fell to normal. Recovery was uninterrupted. All the injections were well tolerated though there was a transitory pallor of the skin after the injection of each of the two final largest doses of the series. The conditions in which the patient was treated did not permit of a very thorough study of the case. *N. W.*

MALARIA.

Précis of Abstracts in this Section.

Wilson (p. 126) reports his findings in the non-immune and partially immune communities of Tanganyika Territory. Control becomes necessary where large numbers of non-immunes are present in endemic areas, in townships, estates and most undertakings of a temporary character. Treatment should not be indiscriminate and should not interfere with the development of immunity in endemic areas. The significance of parasites in the blood is discussed.

The Malaria Advisory Board of the Federated Malay States (p. 128) gives the reasons for the apparent increase in malaria in recent years. The results of tests of a number of drugs are given. Totaquina, Type II, is effective and cheaper than quinine hydrochloride. An anopheline survey is reported.

Schüffner (p. 129) discusses the value of the spleen rate and the necessity for blood examinations in a correct assessment of malaria, and immunity. This is a translation of an old paper published in Dutch in 1919.

Russell (p. 130) in the Gold Coast found that 55·5 per cent. of 600 infants up to 1 year of age showed parasites at a single examination. She therefore administers quinine as a routine to all children brought for treatment.

Russell, Menon and Ramachandra Rao (p. 131) show the state of malaria in an area of the Madras Presidency which was not malarious before the inauguration of an irrigation scheme.

Genevray, Toumanoff and Hoang-Tich-Try (p. 131) describe the epidemiological features of an area south-west of Tonking where both mountainous and low-lying districts are severely infected. Nguyen-Dinh-Hao (p. 132) shows that although Hanoi is practically free from malaria, endemic foci of *falciparum* infections exist in surrounding villages.

Meunier (p. 132) discusses epidemics on board ship and urges the necessity for preventive treatment of crews of boats touching at West African ports.

Blair (p. 133) in Southern Rhodesia found 8 patients with *P. ovale* infection in a limited area where *vivax* and *malariae* infections were also found. The latter two infections are rare since *falciparum* accounts for 96·9 per cent. of the total cases. Ziemann (p. 133) considers that *P. ovale* should be regarded not as a separate species but as a particular form of *P. vivax*. He describes *P. falciparum* subsp. *P. perniciosum* seen in the Cameroons.

Ekblom (p. 134) in Sweden recognizes three races of *A. maculipennis* ; *typicus* which occurs inland, *messae* the most common, and *atroparvus* which is confined to the coasts. No relation can be found between their distribution and the former incidence of malaria. Weyer (p. 134) in Germany also notes that *atroparvus* occurs where the salinity of water is high.

de Meillon (p. 135) reports that *A. gambiae*, though normally breeding in sunlit pools, may, in the absence of these, breed in completely shaded water, for instance in underground cisterns, until the rains provide the normal conditions. There is some reason to consider *A. coustani* var. *tenebrosus* a vector of malaria.

Callot and Ristorcelli (p. 136) found *A. sergenti* larvae for the first time in a district of Tunis. A description is given. Colignon

(p. 136) in Algiers found *A. maculipennis* and *A. hispaniola* to be very prevalent. LANGERON (p. 136) found *A. claviger* and *A. hispaniola* breeding in the Atlas mountains as high as 8,200 feet. *Vivax* epidemics occur in villages in this area. WALKER (p. 137) found infection of *A. gambiae* and *A. funestus* larvae with a fungus, *Coelomyces africanus*, in Freetown. This causes a high larval mortality, and may infect pupae and adults.

WEATHERSBEE & HASELL (p. 137) describes the staining of larvae, which persists to the adult stage and may be useful in studying the dispersion of all forms.

STRICKLAND (p. 137) describes a method of preventing the breeding of *A. ludlowi* by preventing the access of sea water to the coastal lagoons in Bengal and Orissa.

KITCHEN (p. 138) examined the reticulocytes in *vivax* infection and found the percentage infected to be much greater than that of adult red cells. Spontaneous termination of the infection took place while the reticulocyte count remained high.

HINGST (p. 138) points out that as sporulation of *P. vivax* takes place in restricted areas of the viscera or bone marrow, the percentages of infected reticulocytes and mature red cells in the peripheral blood are not reliable criteria of the conditions where sporulation occurs.

GARCIA (p. 138) found infected red cells in sections of the umbilical veins of the foetuses of two pregnant women who died of malaria. Infected red cells were found in the heart blood (in section) and bone marrow of one of them.

SACK (p. 139) reports instances of long incubation periods in *vivax* infections, one of almost a year.

MAYNE and YOUNG (p. 139) found an apparent antagonism between *P. vivax* and *P. malariae* when both infections are present. In 9 of 12 such cases *vivax* was dominant. Probably more instances of mixed infections occur in nature than are found.

MILAM and KUSCH (p. 140) treated 35 patients suffering from general paresis with *P. knowlesi*, with 29 responses. The course is usually moderate but severe reactions may occur.

The article by HENRY to which the abstract (p. 141) refers gives recent results obtained by the use of his reaction.

BRISSOLESE (p. 141) notes that occipital headache, liver tenderness and circulatory disturbance are found in relapsing fever and may serve to differentiate it from malaria if blood examination is not possible. TADDIA (p. 141) records 3 cases of simultaneous subtertian malaria and relapsing fever. Severe headache during the fever was the principal complaint and the general condition was bad, with severe anaemia.

DESNOS and ABÉLY (p. 142) describe the characters of acute and chronic nephritis of malarial origin. An increase in the blood urea was frequently found in 28 patients undergoing courses of therapeutic malaria. Renal function should therefore be watched. Quinine is never contra-indicated in these cases. *C. W.*

COLONIAL DEVELOPMENT FUND (MALARIAL RESEARCH SCHEME). **Report of the Malaria Unit, Moshi, 1936** [WILSON (D. Bagster)].—34 pp. With 5 maps & 9 figs. on 6 plates. 1938. Dar es Salaam : Govt. Printer. [3s.]

This valuable report is concerned for the most part with a study of malaria in communities in the Northern Province of Tanganyika

Territory which are either non-immune or only partially immune to the disease. Prolonged observations were carried out at Moshi School with a population of 380, of which there are 328 Chagga and 34 Pare. These are non-immune hill people of Kilimanjaro. The school is situated at a height of 3,800 feet, at the extreme upper edge of the domestic anopheline zone, and it is improbable that there is any appreciable amount of malaria transmission. Infection is probably acquired by visits to Moshi town.

Spleen examinations at various parts of the inhabited zone of Kilimanjaro, and house searches for anophelines at the end of the rainy season, justified the conclusion that there is no endemic malaria in most of this area. No Anopheles were caught in houses at over 3,000 feet. In contrast to this, Kahe, a community of mixed tribes, on a river, about 2,000 feet above sea level, has a spleen rate of 98 per cent.

Information is given of malaria incidence on the sugar estate of Arusha Chini, and of the seasonal incidence of malaria among the nomadic pastoral Masai. There is a detailed account of the prevalence of malaria in the township of Moshi and of the measures that have been taken there for the control of the disease. Malaria on estates is the subject of another informative section of the report.

In addition to those previously reported, the following species of *Anopheles* have been found in the Northern Province: *garnhami*, *nili*, *pretoriensis*, *pharoensis*, *leesoni* and *funestus* var. *rivulorum*. The first three have never been found in houses. *A. pharoensis* was repeatedly caught at Arusha Chini; twenty-seven gland dissections were negative. The existence of three members of the *funestus* group, *funestus*, *leesoni* and *rivulorum* is of no great practical importance as their breeding places are identical. At Arusha Chini the relative numbers of *gambiae* and *funestus* vary considerably: *funestus* breeding predominates when the furrows are overgrown, *gambiae* when there is less vegetation in the furrows. Sporozoite rates for the year varied from 1·4 to 2·3, much lower rates than are found on the coast. The possibility that different biological races may explain different infectivity rates has been studied, with special attention to the length of wing of *A. gambiae*. There was no significant difference in infectivity between individuals of greater and lesser wing length but the proportion of long winged individuals increases with a rise in atmospheric humidity. In three localities the higher the infectivity the larger was the proportion of long winged insects.

In his general conclusions the author stresses the need for specialists, both European and native, being available for malaria control. The value of the regular searching of selected houses for adult mosquitoes, as affording an index of the residual anopheline population in controlled areas, is underlined. Where malaria is seasonal monthly catches in the off-season and weekly catches in the anopheline season are sufficient.

The only available method of malaria control is anopheline control, a method far too expensive to be recommended unless there are strong grounds on which to base the recommendation. The aggregation in a sufficiently endemic locality of a large number of non-immunes necessitates control. It is necessary in townships, in most undertakings of a temporary character, such as railway construction, on estates which employ a considerable number of non-immune labourers, and on railways. With regard to railways, which pass through some of the most malarious country in the Territory, control

should be established at important stopping places, especially at Mombo, where passengers have to wait during the night for the trains. On the trains themselves the proofing of compartments is advocated. Control is also required in the event of settling non-immune communities in endemic areas. Rapid increase of population in the malaria-free mountain zones may lead to settlement on land in the plains where malaria would become hyperendemic.

With regard to the diagnosis of malaria, the examination of blood films, apart from its clinical value, helps in the determination of the need for anopheline control. Some interesting remarks are made as to the interpretation of the results of blood examinations of Africans. The finding of a few parasites in a non-immune person means that he is suffering from malaria ; not so in an immune person. An immune person may suffer from a heavy infection if he moves to a new place but its significance will not be the same as that of a similar infection in a non-immune. The counting of parasites to 100 or 200 leucocytes is of great value.

In treatment, distinction must be made between immune and non-immune Africans. The presence of a few parasites in an adult who has been brought up in a hyperendemic area calls for no treatment. The indiscriminate distribution of quinine in hyperendemic areas should be discouraged. Non-immunes who go from non-endemic to endemic places require special attention. Schoolboys and prisoners are examples. Mosquito nets should be provided. A special record of such persons should be kept so that they may receive particular attention if attacked. Infants in hyperendemic areas require some protection but no measures should be taken to prevent their requiring immunity. Weekly parasite counts were made on a group of 20 infants at Arusha Chini. Whenever the parasite count rose to 10,000 per cmm. they were given the equivalent of a 10 grain adult dose of quinine on each of two days. This reduced the parasite count greatly but hardly ever to nil. None of these children has been dangerously ill, and the constant presence of parasites would seem to indicate that the development of immunity was not being interfered with.

Norman White.

FEDERATED MALAY STATES. **Annual Report of the Malaria Advisory Board for the Year 1937** [KINGSBURY (A. Neave), Chairman].—19 pp. With 4 charts. 1938. Kuala Lumpur : F.M.S. Govt. Press.

The number of admissions for malaria to Government and estate hospitals is admittedly an imperfect indication of malarial conditions in any given year, but it is the only one available in the Federated Malay States as in many other places. The estate populations vary with the prosperity of the rubber industry. The prejudice of the kampong population against hospitalization is gradually declining. During 1937 the total number of malaria cases admitted to hospital numbered 35,483. If the number of hospitalized cases in 1933 be represented by 100, the corresponding ratios for the four succeeding years are 97, 138, 118 and 154. Factors referred to above played an unknown part in the apparent considerable increase of malaria prevalence : meteorological conditions and the immigration of large numbers of non-immune labourers also contributed. The replanting of rubber was undertaken on a much larger scale than in the two preceding

years, an operation that, on certain estates, was associated with a marked increase in anopheline breeding. Increased prevalence was least marked in Perak and most in evidence in Pahang, where the number of cases treated in estate hospitals increased from 598 in 1936 to 1,393 in the year under review. Seven cases of blackwater fever were reported, four of which were from Pahang. The case mortality rate was 2·2 per cent., as in 1936. As usual, February and March were the months of lowest incidence : the April to June peaks in the malaria curves of the four States approximated to those of the previous year. The main increase in the 1937 prevalence occurred from August onward.

Further work on testing remedies for malaria was carried out. Totaquina, Type II, was found as effective as quinine : its cost is only half that of quinine hydrochloride. A remedy called " Malarene," a proprietary preparation (not the standardized cinchona product prepared in Madras which bears the same name) was tried on 32 patients and found to be much less effective than quinine. A small sample of another proprietary preparation, Homaline I, was tried on five patients without success. Paludex (quinine and sodium disulphonate of cupreous oxyquinolein), of which favourable reports have been published from the Belgian Congo, is being tried on a series of cases. Paludex alone does not control the parasites and fever of local strains of *P. falciparum* : it appeared to have less effect than quinine on *falciparum* gametocytes. Paludex plus quinine appeared to be no more effective than quinine alone.

The year's work has shown that 0·3 gm. of atebrin weekly suffices for the effective control of clinical malaria.

The anopheline survey of part of the Selangor coast area continued. In Rantau Panjang the percentages of total anophelines caught in a human-bait trap and cattle sheds, respectively, were : *A. barbirostris*, 15 and 1 ; *A. hyrcanus* var. *sinensis*, 29 and 69 ; *A. sundaicus*, 51 and 5. Both *barbirostris* and *sundaicus* appear to have a marked preference for human blood.

Investigations of anti-malarial larvicide oils continued.

Where drains are liable to be attacked by acid water cement " Fondu " has given satisfactory results. In such places where new drains are required glazed channels are inset in the inverts.

Experimental control of *A. maculatus* breeding by shading has not yet proved very successful. *N. W.*

SCHÜFFNER (W. A. P.). **Two Subjects relating to the Epidemiology of Malaria.**—*Jl. Malaria Inst. of India.* 1938. Sept. Vol. 1. No. 3. pp. 221–256. With 6 diagrams. [28 refs.]

This paper was originally published in 1919 in Dutch [see this *Bulletin*, 1920, Vol. 16, p. 317], it was accompanied by an English translation which, though inadequate and not free from ambiguity, enabled the student of malaria unacquainted with the Dutch language to realize that a classical contribution to the literature of his subject had been made. The Malaria Institute of India has rendered a valuable service to English readers by republishing an excellent translation of the original paper. There can be but very few contributions to the epidemiology of malaria written 20 years ago that have retained their freshness and up-to-dateness as this has done. It still affords stimulating reading.

An adequate summary of the paper would require much space. It should suffice to remind the reader of its nature and scope. It is based largely on observations which the author carried out for two years in Mandailing, an intensely malarious locality in the Netherlands East Indies, where the average individual was being infected at least four times a year, where the disease had been rampant for several generations at least, where malaria transmission occurred all the year round and where the total mortality approximated 45 per thousand of the sickly population, a rate but very little less than the birth rate. As a contrast to these conditions the findings of Dr. and Mrs. SWELLENGREBEL in Sundatar (Sumatra) [see this *Bulletin*, 1920, Vol. 16, p. 318] during an epidemic of malaria in villages that had previously suffered but little if at all from that disease, are discussed.

The first part of the paper deals with the importance of determining the spleen rate and the limits of its usefulness. This includes a discussion of the correlation between splenomegaly and the presence of malaria parasites in the blood; the deductions that may be drawn from the age distribution of splenomegaly as to the indigenous nature of the disease; the density of infection or the number of times each individual is likely to be infected in a given area in a given time in relation to splenomegaly. The determination of the spleen rate is of great value if the examination is carried out according to fixed rules, if the degree of splenic enlargement is recorded and if adults are included in the survey. It also facilitates the interpretation of other data. As a simple method of orientation in new surroundings and as an indicator of changes in malaria conditions, the method has no equal but blood examinations are also indispensable.

The second and perhaps the most valuable part of the paper is concerned with observations regarding immunity arising from a study of the parasite content of the blood in a malarious population. The parasite picture in an acute epidemic is contrasted with the parasite picture under chronic endemic conditions. Most, if not all, of the deductions and interpretations are now current in malaria literature but they have never since been better presented. *N. W.*

RUSSELL (Beatrice A. S.). **Incidence of Malaria among African Children.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1938. Aug. 25. Vol. 32. No. 2. pp. 237–242.

The writer of this paper has had twelve years' experience of medical work among the women and children of the Gold Coast. She has found that malaria is excessively prevalent among infants during the first year of life though the symptoms and clinical signs are frequently ill-defined. This excessive prevalence led her to adopt the practice of giving quinine to all children brought for treatment. During three months in 1937 the blood of 600 infants without selection, aged from 11 days to 1 year, who were brought to the clinic in Kumasi, Ashanti, for the first time, was examined. Though but a single examination was made of each child 55·5 per cent. were found infected. There was a palpable spleen in 41·5 per cent. Only 12·6 per cent. had temperatures of 100°F. or over. Anaemia, judged by pallor of mucosae or poikilocytosis and anisocytosis, was noted in 23 per cent. The highest infection rate, 73 per cent., was in the 3 to 6 months age group :

in the less than 3 months age group it was 36 per cent. The writer considers that the results of this investigation justify the routine administration of quinine which she has adopted. *N. W.*

Russell (Paul F.), Menon (M. Kumara) & Ramachandra Rao (T.). **Epidemiology of Malaria in Pattukkottai Taluk, Tanjore District, Madras Presidency, India.**—*Jl. Malaria Inst. of India.* 1938. Sept. Vol. 1. No. 3. pp. 285–326. With 6 graphs, 1 fig. & 1 map.

Pattukkottai is a revenue division in the southern part of the Tanjore District extending southward to Palk Strait which separates it from the north-west extremity of Ceylon. It covers an area of 434,000 acres and has a population of 279,000. There are 474 villages : there are only 4 towns with populations exceeding 5,000. It is a dry level tract devoid of hills. It was not malarious prior to the inauguration of an irrigation scheme, part of the Mettur-Cauvery project, in 1933. Increased value of land and crops is being paid for in malaria. The observations recorded in this preliminary report extended from July 1936 to March 1938. It is a well documented report.

Twelve species of *Anopheles* were collected :—*aconitus*, *annularis*, *barbirostris*, *culicifacies*, *hyrcanus* var. *nigerrimus*, *jamesi*, *pallidus*, *stephensi*, *subpictus*, *tessellatus*, *vagus* and *varuna*. *A. culicifacies* is the only effective carrier (13,335 dissections made) but not an energetic one : the oöcyst index was 0·07 per cent. (5,676 guts examined) and the sporozoite index, of 6,483 glands dissected, was 0·08 per cent. Though a house frequenter only 0·25 per cent. gave a positive human precipitin reaction. It breeds in irrigation water. There is an absence of drainage canals for irrigation water and irrigation has very markedly raised the subsoil water level.

Four thousand five hundred spleen examinations and blood smear examinations were made in 40 villages. For the taluk as a whole the spleen index is over 40 per cent., the parasite index over 30 per cent. and the gametocyte index over 13 per cent. The spleen index and the parasite index for boys, 39·7 and 32·3 per cent., were significantly greater than for girls, 30·3 and 21·9. More than half of the children with spleens palpable only on deep inspiration harboured malaria parasites. About two-thirds of the infections were *falciparum* and somewhat less than a quarter *vivax*. A slightly greater percentage of *falciparum* infected children had palpable spleens than had *vivax* infected children. It is possible that malaria may be transmitted in any month of the year but there is evidence of a malaria season extending from July to January when the chances of contracting infection are considerably greater than in the remaining five months of the year. *N. W.*

Genevray (J.), Toumanoff (C.) & Hoang-Tich-Try. Contribution à l'étude du paludisme au Tonkin. (Sites des récifs calcaires de la région du Sud-Ouest.) [**Contribution to the Study of Malaria in Tonking : Region of Calcareous Ridges in the South-West.**]—*Rev. Méd. Française d'Extrême-Orient.* 1938. Mar. Vol. 16. No. 3. pp. 161–169. [12 refs.]

In Tonking, and in the basin of the Red River generally, there are five more or less well-defined regions in which physiographic conditions vary considerably, variations which influence the anopheline fauna and

malaria incidence alike. These are the sea coastal region, the deltaic region, the middle region with rounded hills, the upper, mountainous, region, and the high mountain region above 600 metres. Yet another area with special malaria characteristics is the subject of this report. It lies to the south-west of Tonking and includes parts of the provinces of Hoa-Binh and Ninh-Binh. It consists of a series of calcareous ridges rising from land that is little if anything above sea-level and which formerly rose from the sea. None of them exceeds 800 metres in height. In places rounded hills with gentle slope alternate with the characteristic calcareous ridges. The old alluvial soil is fertile and rice-fields and coffee plantations are the source of the wealth of this corner of Tonking: there are agricultural communities of some importance. There are numerous streamlets and collections of standing water favourable for anopheline breeding.

Epidemiological data were collected in three communities. The splenic index varied from 56 to 93 per cent., the parasite index from 28 to 66 per cent. *P. vivax, malariae* and *falciparum* were all found, *falciparum* greatly preponderating. Malaria is in fact as severely prevalent in this low-lying area as in the high mountainous region and it is with difficulty that Annamite labour can be acclimatized to the conditions. All the anophelines found in the mountainous region were found here too: *aconitus, barbirostris, fuliginosus, hyrcanus* var. *sinensis, jeyporiensis* var. *tonkinensis, karwari, kochi, maculatus, maculipalpis, minimus, philippinensis, tessellatus* and *vagus*. *A. minimus, jeyporiensis* and *aconitus* together formed more than 50 per cent. of the total number caught; the two former are the two chief vectors of Tonking. As in the high regions *A. minimus* was most prevalent during the dry season though larvae were numerous also during the rains, May to September. *A. jeyporiensis, maculatus* and to a less degree *aconitus* are also dry season mosquitoes. For some reason unknown *A. vagus* was relatively rare. One specimen of *A. aconitus* was found infected, out of 356 dissected in the dry weather; zoophile tendencies explain the normal unimportance of this species as a vector. The infection rate of *A. minimus* for all seasons was 6·45 per cent., an infection rate higher than that found in many parts of the mountainous region. *N. W.*

NGUYEN-DINH-HAO. Note sur le paludisme à Hanoi et les environs. [**Malaria in Hanoi and Neighbourhood.**]—*Bull. Soc. Méd.-Chirurg. Indochine.* 1937. Dec. Vol. 15. No. 10. pp. 1191–1195.

Hanoi is practically free from indigenous malaria but in the outskirts of the town are several endemic foci, the most important of which is the *Banc de sable*, a group of villages housing upwards of 20,000 people. Here malaria is contracted with frequency, the majority being *falciparum* infections. *N. W.*

MEUNIER (R.). Au sujet des "épidémies nautiques" de paludisme. [**Malaria Epidemics on Board-Ship.**]—*Bull. Office Internat. d'Hyg. Publique.* 1938. July. Vol. 30. No. 7. pp. 1563–1565.

A cargo boat loaded with ground-nuts left Ziguinchor on the 19th October. When she touched at Gibraltar on the 31st of October there were cases of fever on board. On the 3rd of November she was forced to put into Algiers, as 13 of a total strength of 17, officers and

crew, were down with fever. Blood examination revealed *P. falciparum* in 12 cases; in two of these cases *falciparum* was associated with *malariae*. There were no deaths though six of the cases were very severe attacks. The author urges the necessity for serious preventive malarial treatment for the crews of boats touching at West African ports between May and January. *N. W.*

Blair (D. M.). **Infections with *Plasmodium ovale* Stephens in Southern Rhodesia.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1938. Aug. 25. Vol. 32. No. 2. pp. 229–236. With 3 charts & 24 figs.

The examination of a large number of blood films in connexion with a trypanosomiasis inquiry revealed eight cases of infection with *P. ovale*. All the cases were in people from a limited area on the Umniati River, between the confluence of the Umniati and Ingondomo Rivers and Robb's Drift. The parasite as figured and described conforms in all respects with the original description of Stephen and Owens. Measurements of red cells in one case show that *ovale* infection causes but very slight enlargement, much less than does *vivax*. It is interesting to note that in the area in which these cases were found a few cases of *vivax* and *malariae* infection were also seen; both these species are rare in Southern Rhodesia, where *falciparum* was found in 96·9 per cent. of the positive blood films examined in Government laboratories.

N. W.

Ziemann (Hans). Zum Problem der Bildung verschiedener Rassen, Varietäten oder Spezies bei den Malaria-parasiten. [**The Problem of the Development of Different Races, Varieties or Species of Malaria Parasites.**]—*Zent. f. Bakt.* I. Abt. Orig. 1938. Oct. 17. Vol. 142. No. 7/8. pp. 366–373. [26 refs.]

This paper is an expanded version of a lecture given by the author at the International Malaria Congress at Amsterdam, September 1938. He accepts the three species of malaria parasites, *P. vivax*, *P. malariae* and *P. falciparum* as definite, and the transformation of one species into another can be ruled out. Some workers have regarded *P. tenue* and *P. ovale* as separate species. The author has earlier viewed these as particular forms of *P. vivax* or *P. falciparum*, with which they were always found. The species nature of *P. tenue* is generally denied but *P. ovale* finds more support among malariologists as a definite species. As far as the author is aware there is no region where *P. ovale* is found exclusively and he decides against the species nature of this parasite, quoting in support the reversal to *P. vivax* type when inoculation experiments were performed with the so-called *P. ovale*. The *P. camarense* of the author also named *P. vivax* var. *minutum* Emin has recently been identified with *P. vivax*. Different strains of *P. vivax* are accepted by the author, for example the Dutch and Madagascar strains, and the absence of such differentiation in the case of *P. malariae* is noteworthy. Attention is drawn to some of the findings of earlier workers with *P. falciparum* whose descriptions agree apparently with those for pigmentless forms described by Raffaele and James.

Different forms showing alteration in the life-cycle have been isolated from *P. falciparum* by various workers. From his observations in 1896 the author designated such a form as *P. falciparum* var. *perniciosum* and in his view it should now be called *P. falciparum* subsp.

P. perniciosum. Such forms in freshly infested patients showed a marked virulence. He points out that if definite species, varieties or strains are to be separated a standard technique, which he outlines, must be followed, and consideration must be given to the general picture including morphology, immunobiological reactions and clinical findings. The author describes his findings in regard to the suggested subsp. *P. perniciosum* seen in the Cameroons. The appearance of schizonts and half-moon forms in the peripheral blood, character of pigment, colour of infected red cells, number of merozoites, absence of crescents, size of ripe oöcysts, resistance to quinine and clinical manifestations with special reference to blackwater fever, are dealt with. Support for his views is adduced from a recent description of an Ethiopian variety of *P. falciparum*. Further examples of definite differentiation of the species *P. falciparum* are cited from the literature.

[Stephens (1922) described what he considered to be a new species of malarial parasite and proposed the name *P. ovale*. Later he confirmed the description of it from another source. Yorke & Owen (1930) showed that the morphological features of this parasite remain constant when infection is carried on by blood inoculation. James *et al.* (1932) transmitted it through *Anopheles maculipennis* without any changes in character. They considered *P. ovale* without doubt a separate species. In 1933 the same authors write, after marshalling all the facts " that there is in reality no disputable question concerning the nomenclature of *P. ovale*."] *J. D. Fulton.*

Ekblom (Tore). Les races suédoises de l'*Anopheles maculipennis* et leur rôle épidémiologique. [Deuxième communication.) [**Races of *A. maculipennis* in Sweden.**]—*Bull. Soc. Path. Exot.* 1938. July 6. Vol. 31. No. 7. pp. 647–655. With 3 figs.

This is a re-investigation of the races of *Anopheles maculipennis* occurring in Sweden in the light of the changes in nomenclature that have been made since the publication of an earlier communication [see this *Bulletin*, 1935, Vol. 32, p. 812]. The author now recognizes three races: (i) *A. typicus*, which occurs only inland and usually in low-lying country. This race extends its range farthest to the north. (ii) *A. messeae*, which is the most common and widely distributed form. (iii) *A. atroparvus* (called *labranchiae* in the earlier paper), which is the most restricted form, confined to the coasts. This distribution is attributed in part to the greater salinity of the water, in part to the higher temperature. No relation can be established between the present distribution of these races and the former incidence of malaria in Sweden. *V. B. Wigglesworth.*

Weyer (Fr.). Die geographische Verbreitung der Rassen von *Anopheles maculipennis* in Deutschland. [**The Geographical Distribution of the Races of *A. maculipennis* in Germany.**]—*Ztschr. f. Parasitenk.* 1938. Oct. 17. Vol. 10. No. 4. pp. 437–463. With 6 figs. [25 refs.]

The author gives a full account of the distribution of races of *Anopheles maculipennis* in Germany, including the relative abundance of the races in many of the localities.

In Germany *atroparvus* is exclusively coastal, and often limited to a zone only a few miles wide, but it also occurs away from the coast in spots where natural waters have a rather high salt content. The relation of larva to salinity is not a simple one. The only other races found are *messeae* and *typicus*, the latter rare.

The paper includes a large number of measurements of salinity (particularly of water in which *atroparvus* breeds), and descriptions with photographs of breeding places which are typical of different races. Information on breeding places of *A. claviger* (*bifurcatus*) is included. *P. A. Buxton.*

Neri (F.) & Gratch (I.). Distribuzione delle razze anofeliniche nelle zone malariche della provincia di Ravenna. [**Distribution of Anophelines in Ravenna.**]—*Riv. di Malariologia.* Sez. I. 1938. Vol. 17. No. 4. pp. 242–261. With 1 map & 2 figs. [24 refs.] English summary (9 lines).

de Meillon (Botha). **A Note on *Anopheles gambiae* Giles and *Anopheles coustani* var. *tenebrosus* Donitz from Southern Africa.**—*South African Med. Jl.* 1938. Sept. 10. Vol. 12. No. 17. pp. 648–650.

(a) *Anopheles gambiae* as a "domestic breeder."

A. gambiae is well known in Africa as a breeder in sunlit pools. In this short paper the author reports the finding of larvae in the island of Moçambique in rainwater stored in total darkness in two large, closed, concrete underground cisterns and one larva in water kept in a barrel in a house.

At the time of the author's two-day visit there were only two open pools on this small built-up island, both were brackish and contained no larvae.

In Kenya, Symes has recently reported the finding of the larvae of *A. funestus* in almost similar domestic situations.

The author concludes that in the island of Moçambique, *A. gambiae*, in the absence of normal breeding places, resorts to these completely shaded underground cisterns. He suggests that the species is thus kept alive until the arrival of the rains and the preferred breeding places are again available.

(b) *Anopheles coustani* var. *tenebrosus* as a possible vector of human malaria.

This mosquito is common in the marshy coastal regions of Natal, Zululand and Portuguese East Africa, where the following observations were made.

Precipitin tests on blood meals of female *tenebrosus* taken from a cattle shed occupied at night by 14 cows and several natives showed bovine reactions only. A solitary *A. funestus* was taken in the cattle shed, but in a hut nearby *A. funestus* and *A. gambiae* were plentiful. Precipitin tests on these malaria vectors showed no bovine reaction. Men living in the open and in a tent near the breeding places of *tenebrosus* were constantly bitten by this mosquito, mainly between 6 and 7 p.m. Female *tenebrosus* fed readily in the laboratory on a human volunteer, though none became infected.

The author's main conclusions are that *A. funestus* and *A. gambiae* failed to locate the men in the cattle shed because of the overpowering presence of the cattle, that *tenebrosus*, though zoophilic, will attack

man in the absence of cattle, and that the evidence so far that *tenebrosus* is not a vector of malaria is inconclusive. He suspects that as this variety is common in the winter months when the normal vectors are inactive, *tenebrosus* may play a part in the propagation of winter malaria. *H. S. Leeson.*

CALLOT (J.) & RISTORCELLI (A.). Localité nouvelle pour *Anopheles* (*myzomyia*) *sergenti* Theobald, 1907. [**New Locality for** *Anopheles sergenti*.]—*Arch. Inst. Pasteur de Tunis.* 1938. Mar. Vol. 27. No. 1. pp. 105–107. With 4 figs.

This reports the finding of *A. sergenti* breeding in the oasis of Mansours, six kilometres from Kebili in Tunis, the first occasion on which this relatively rare, but widely distributed, North African species has been reported from this locality. The larvae were found in a small shallow swamp under palm trees and were therefore relatively shaded for a great part of the day. The swamp contained an alga, *Cladophora fracta* and a reed, *Phragmites communis*, and was edged with *Limonium delicatulum*. Attention is called to characteristics easily recognized serving to distinguish the larva of *A. sergenti* from those of *multicolor* and *hispaniola* which are much more common in Tunis: a palmate hair on the first abdominal segment and a very distinct palmate hair on the metathorax; the palmate hairs of the abdomen are remarkably long and slender. The adult females are easily identified by the wide white band on the palps. *N. W.*

COLLIGNON (E.). Observations sur les gites à larves d'anophèles en Algérie (1937) (département d'Alger). [**Observations on Anopheline Breeding Places in the Department of Algiers during 1937.**]—*Arch. Inst. Pasteur d'Algérie.* 1938. June. Vol. 16. No. 2. pp. 157–160. With 1 fig.

This paper records the place and date of the first findings of the larvae of anophelines in the Department of Algiers during 1937, following an abnormally dry cold season. *A. maculipennis* is ubiquitous; *A. hispaniola* is likewise very prevalent, and *algeriensis*, *bifurcatus* and *marteri* also occur. Breeding began later than usual and breeding places were less numerous. *N. W.*

LANGERON (Maurice). Anophèles du Grand Atlas et de l'Anti-Atlas marocains. [**Anopheles in the Atlas Mountains, Morocco.**]—*C. R. Acad. Sci.* 1938. July 18. Vol. 207. No. 3. pp. 260–262.

Two species of Anopheles, *A. claviger* and *A. hispaniola*, were found breeding in grassy pools in the high valleys among the Atlas Mountains, at altitudes as great as 2,500 m. (8,200 feet). These regions are covered with snow for more than half the year. At the time of the author's visit some of the villages in these valleys were suffering from epidemics of malaria caused by *P. vivax*. *V. B. Wigglesworth.*

SEN (P.). On Some Physico-Chemical and Vegetation Factors of the Breeding Places of *Anopheles sundaicus* Rodenw.—*Jl. Malaria Inst. of India.* 1938. Sept. Vol. 1. No. 3. pp. 257–260.

WALKER (A. J.). **Fungal Infections of Mosquitoes, especially of *Anopheles costalis*.**—*Ann. Trop. Med. & Parasit.* 1938. Oct. 12. Vol. 32. No. 3. pp. 231–244. With 2 diagrams & 2 plates. [14 refs.]

The author reviews previous work on fungal infections in mosquito larvae and describes a new species which is not rare in Sierra Leone in Anopheles species.

Fungi, here described as *Coelomyces africanus*, are rather often to be found in larvae, less often in pupae and adults, of *Anopheles gambiae* [referred to as *A. costalis* in the title] and *funestus* in and near Freetown. The organism causes a very high mortality in larvae; when a light infection occurs in an adult female the fungus is confined to the ovaries and eggs do not develop.

The fungus (fungi?) gives rise to four types of sporangia. It is not clearly established that they belong to a single species of organism, and on the mycological side much more work appears to be desirable.

P. A. Buxton.

WEATHERSBEE (Albert A.) & HASELL (Philip G.). **Mosquito Studies. On the Recovery of Stain in Adults developing from Anopheline Larvae stained in Vitro.**—*Amer. Jl. Trop. Med.* 1938. Sept. Vol. 18. No. 5. pp. 531–543.

The authors put larvae of mosquitoes in dilute stains. This colours some of the internal organs, and the dye persists through the pupal into the adult stage. This might be a valuable method of studying the dispersion of larvae, pupae or adults.

A number of microscopic stains have been tried, and the result is said to be highly satisfactory. With certain stains the colour in the underlying tissues may be seen in a living adult; sometimes it can only be found by dissections. The most satisfactory stains are Giemsa's, Wright's, methylene blue, and Congo Red. They are used very dilute for a long period. For instance, Giemsa stock solution is diluted 1/250 and larvae left in it 3 days; every adult was unmistakably stained, and one remained so 39 days after emergence. The larval mortality with these stains was not great. *P. A. Buxton.*

STRICKLAND (C.). **Malaria in Relation to the Coastal Lagoons of Bengal and Orissa.**—*Indian Med. Gaz.* 1938. July. Vol. 73. No. 7. pp. 399–402. With 2 maps & 4 figs. on 1 plate.

The author describes lagoon formation, shallow expanses of water shut off at times of low water from the river, or sea-currents, by a bank, while they are flooded over at times of high-water. As examples Chilka Lake on the coast of Orissa and a lagoon at Chatrapur are described. If these coastal lagoons contain water rendered brackish by communication with the sea, *A. ludlowi* may breed in abundance and severe malaria result. If, on the other hand, they be bunded up, receiving only fresh water, the resultant expanse of shallow sweet water supporting dense aquatic vegetation does not breed malaria-carrying anophelines. *N. W.*

KITCHEN (S. F.). **The Infection of Reticulocytes by *Plasmodium vivax*.**—*Amer. Jl. Trop. Med.* 1938. July. Vol. 18. No. 4. pp. 347–359. With 2 charts. [12 refs.]

The observations recorded in this paper were made on two patients inoculated for therapeutic purposes by mosquitoes infected with *P. vivax*. Neither case had any antimalarial medication. One patient, after an incubation period of 12 days, had daily paroxysms for 54 days, 26 of which were accompanied by chills. Reticulocyte smears were examined daily from the 7th day of the disease. The second patient, after an incubation period of 13 days had 44 paroxysms during 46 days, with 20 rigors. Reticulocyte smears were examined from the 6th day of illness till the 4th day after the last paroxysm. The reticulocyte preparations were made by the dry slide method, using Wright's stain (Grubler) in place of brilliant cresyl blue. The smears were made within an hour of the termination of the chill, or if there were no rigor, during the elevation of the temperature. Total red cell counts, haemoglobin estimations and total parasite counts were also made. Reticulocytes and parasitized cells were enumerated, and the age of the parasite and the type of cell infected, whether reticulocyte, mature erythrocyte, or an erythrocyte containing Schüffner's dots, were noted. The percentage of reticulocytes infected was much greater than that of adult red cells. In about three-quarters of the observations the actual number of infected reticulocytes exceeded the number of infected adult red cells. Multiple infections were more numerous in reticulocytes. In both these untreated cases there was a marked increase in the number of reticulocytes above normal limits during the latter part of the infections; anaemia is inevitable in uninterrupted infections of two weeks' duration. The infections terminated spontaneously while the reticulocyte counts remained at very high levels. *N. W.*

HINGST (H. E.). **Erythrocyte Susceptibility to *Plasmodium vivax*, Grassi and Feletti, 1890.**—*Amer. Jl. Trop. Med.* 1938. July. Vol. 18. No. 4. pp. 361–372. With 3 graphs.

This paper combats the theory originally put forward by EATON that the red cells are susceptible to invasion by malaria parasites only during the reticulocyte stage. The author points out that sporulation of *P. vivax* takes place largely in restricted areas of the viscera or bone marrow. It follows, therefore, that the percentages of infected reticulocytes and mature red cells in the peripheral blood are not reliable criteria of the conditions where sporulation occurs. Multiple infection of red cells is not frequently observed except in infections with certain strains of *P. vivax*. In these strains the author believes that amitotic division of the parasites is responsible for this multiple infection. *N. W.*

GARCIA (Eusebio Y.). **Can Malaria be contracted in Utero?**—*Jl. Philippine Islands Med. Assoc.* 1938. Mar. Vol. 18. No. 3. pp. 141–146. With 8 figs. on 4 plates.

The post-mortem findings of two cases are recorded. A woman six months pregnant died of cerebral malaria. Her blood immediately before death contained numerous ring forms, some old trophozoites and a few schizonts of *P. falciparum*. The post-mortem examination

was made two hours after death. Sections of the placenta showed an enormous number of infected red cells in the intervillous spaces; some 90 per cent. of the red cells were infected. A few infected red cells were seen in the vein of the cord. The second case was that of a woman four months pregnant who also died of cerebral malaria. Sections of the cord showed infected red cells in the umbilical vein. Sections of the foetal heart showed a large number of infected red cells in the heart chambers and in the myocardial vessels. Numerous phagocytes laden with pigment were also seen in these sections. Similar findings resulted from the examination of the bone-marrow of the femur and the femoral vessels.

Reference is made to the literature concerning possible congenital infection in malaria. [See also this *Bulletin*, 1933, Vol. 30, pp. 474–475; 1934, Vol. 31, pp. 419, 427, 689; 1935, Vol. 32, pp. 125, 126, 408, 838; 1936, Vol. 33, pp. 225, 229, 264, 783.] *N. W.*

Sack (Georg). Beitrag zur Malaria mit langer Inkubationszeit. [**Malaria with Long Incubation Period.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1938. Nov. Vol. 42. No. 11. pp. 503–506. [11 refs.]

The author records the history of a boy (F. H.) of 16 years of age, who went from Germany for a holiday in Italy along with a party of boys. They arrived in Terranova, Sardinia, on 3rd August, 1935. There the boy was severely bitten by insects in the night as he was sleeping in the open. He felt seedy the next day but was quite fit on the following day and was not again sick. Another boy of the party fell sick on the same day with vomiting and fever and was under treatment for 12 days and joined the party later. The boys returned home on 28th August, 1935. Eight to ten days after the return, one boy of the party, G., was attacked with malaria in Saarbrücken.

The author's patient remained well till the summer of 1936. In July he became ill and on the 29th had an attack of fever and examination of his blood showed the presence of *Plasmodium vivax*. The febrile attacks were severe. He was treated with atebrin and plasmoquine in the usual way and three months afterwards the spleen, which was considerably enlarged during the attack, was no longer palpable. He had no relapse.

The author discusses fully the views held regarding prolongation of the incubation period of malaria, and refers to James's work on the occurrence of sporozoites in the reticulo-endothelial system. He inclines to the view that the prolongation in his case was due to the small number of parasites introduced at the time of infection.

E. D. W. Greig.

Mayne (Bruce) & Young (Martin D.). **Antagonism between Species of Malaria Parasites in Induced Mixed Infections. (Preliminary Note.)**—*Public Health Rep.* 1938. July 29. Vol. 53. No. 30. pp. 1289–1291.

In the State Hospital, Columbia, S.C., tertian malaria is used in the treatment of white paretics, and quartan in the treatment of Negroes, many of whom are immune to tertian. The two species combined were used in the treatment of 16 white and 4 Negro paretic patients. Intravenous injection of 5 to 10 cc. of blood was the method of

infection employed. The 4 Negroes developed only *P. malariae* infections. One white patient developed a *malariae* infection only; three, *vivax* infections only, the remaining 12 developed mixed infections. Of the 12 patients showing both species *P. vivax* was the dominant species in nine. *P. malariae* was injected first. In the nine cases in which *vivax* predominated the quartan parasites appeared and began to develop quartan paroxysms. Then *vivax* appeared and increased rapidly in numbers. For a few days both species caused paroxysms; thereafter *P. malariae* decreased rapidly in numbers and the paroxysms became tertian or quotidian. In three of these cases *P. malariae* disappeared when *vivax* became numerous, and did not reappear. In three of the cases which showed both parasites *P. malariae* dominated *P. vivax*; in two of these cases *vivax* disappeared. Paroxysms resulting from the simultaneous sporulation of the two species were not more severe clinically than paroxysms caused by one species alone. There is an apparent antagonism of one species against the other. It is probable that in natural conditions there are many more cases of mixed infection than are revealed in field surveys when only few blood examinations of each person are made. *N. W.*

Milam (D. F.) & Kusch (Ernest). **Observations on *Plasmodium knowlesi* Malaria in General Paresis.**—*Southern Med. Jl.* 1938. Aug. Vol. 31. No. 8. pp. 947–949. [Summary appears also in *Bulletin of Hygiene.*]

The most commonly employed agent in induced malaria is *P. vivax*, but some white persons are partially or completely immune to it, and negroes seem also generally to be refractory. It may also be difficult to maintain the strain if there are insufficient patients. A solution of the difficulty was offered when Knowles and Das Gupta successfully inoculated volunteers with a strain of monkey malaria now known as *P. knowlesi*, as it can be kept going in rhesus monkeys, and in human beings responds readily to quinine. van Rooyen and Pile in England and Ciuca in Rumania have reported favourably on it, but Nicol (Epsom) does not regard it as equal to *P. vivax*.

The authors treated with *P. knowlesi* 35 patients, of whom 15 had previously undergone mild attacks of malaria or had resisted infection with *P. vivax*. Six of the 35 were coloured patients and responded only mildly or not at all, while all of the 29 whites reacted. The incubation period after intravenous inoculation with 1 to 5 cc. whole blood varied from 3 to 13 days (average 5). The average attack took a quotidian course for about 10 days, after which it declined gradually to normal without intervention. In one case the course had to be interrupted because of severe symptoms and in 5 quinine was used for mild relapses. Such may occur as long as four months after the first infection. The effects on the patients' G.P.I. are summarized, but a comparison with those of malaria by *P. vivax* is impracticable. The authors say that some value of the *P. knowlesi* malaria as a therapeutic agent was demonstrated in 48 per cent. of their cases.

They conclude that the strain has a limited application; the moderate course often terminating spontaneously is an advantage, though one must be on the lookout for occasional severe infections.

L. W. Harrison.

Gouriou (E.). Éruption morbilliforme et urticaire d'origine palustre. [**Morbilliform Urticarial Rash of Malarial Origin.**]—*Bull. Soc. Path. Exot.* 1938. July 6. Vol. 31. No. 7. pp. 614–617.

Henry (A. F. X.). Données récentes fournies par l'étude de la séro-floculation palustre. [**Recent Data concerning Serum Flocculation in Malaria.**]—*Gaz. hebd. Sci. Méd. Bordeaux.* 1938. Aug. 14. Vol. 59. No. 33. pp. 491–496. [Refs. in footnotes.]

This paper summarizes recently published results obtained by numerous research workers on the subject of Henry's reaction, and the significance of these results. Most of these contributions have been noted in this *Bulletin*. There is a useful discussion of the value of the reaction in diagnosis and treatment. *N. W.*

Brissolese (Angelo). Malaria e febbre ricorrente diagnosi differenziale clinica. [**Clinical Differential Diagnosis of Malaria and Relapsing Fever.**]—*Arch. Ital. Sci. Med. Colon. e Parassit.* 1938. June. Vol. 19. No. 6. pp. 377–380.

The differential diagnosis of malaria and relapsing fever, if microscopic examination be unavailable, may be attended with difficulty. In malaria there is often frontal headache ; the liver is not painful on palpation, and the heart and the circulation are generally but little disturbed. In relapsing fever the headache is commonly occipital, the liver is apt to be painful to palpation and there is often marked circulatory disturbance, with decreased tension and signs of cardiac failure. *Spirochaeta recurrentis* is more virulent than *duttoni*. Notes are given of five cases of relapsing fever. *N. W.*

Taddia (Leo). Considerazioni su casi di infezione mista da plasmodium e spirochete riscontrati in Somalia. [**Cases of Mixed Infections by Malaria and Relapsing Fever in Somalia.**]—*Arch. Ital. Sci. Med. Colon. e Parassit.* 1938. July. Vol. 19. No. 7. pp. 432–436. With 3 charts.

The author puts on record three cases in patients exhibiting fever of a malaria type at the onset of illness, but in whom examination of the blood revealed a double infection with *P. falciparum* and a spirochaete. One may be given in more detail as an example. At a time when he was feeling well, the patient was seized with chilliness and waves of heat ; he took quinine and plasmoquine and remained in bed. Five days later, feeling quite well again, he returned to work ; two days later he had severe headache and the fever returned, falling by crisis the following morning ; again in two days from the last onset of fever, *i.e.*, after a day's interval free of fever, he had another attack and a third on the succeeding day and he came to hospital. Severe headache was the chief, almost the sole, complaint during the fever. After five days the temperature again rose. The malaria did not influence the appearance of the relapsing fever, in fact, the general condition in each of the three was worse than was seen in other patients suffering from either infection alone, and the anaemia resulting was " severe " [but details of the blood picture are not given]. *H. H. S.*

Desnos (E. H.) & Abély (Paul). Le syndrome rénal d'origine paludéenne. [**Renal Syndrome of Malarial Origin.**]—*Rev. Méd. et Hyg. Trop.* 1938. July–Aug. Vol. 30. No. 4. pp. 207–223. [23 refs.]

In the course of several sojourns in Senegal, the Sudan and the Ivory Coast the first named author has frequently seen cases of acute and of chronic nephritis of malarial origin. The acute forms are of sudden onset, and characterized by high temperature, generalized pains most marked in the lumbo-sacral region, facial oedema, cerebral symptoms such as convulsions or aphasia, occasionally slight dilatation of the pupils, often slight yellowish discoloration of the conjunctivae, never vomiting but sometimes regurgitation of acid liquid, and very occasionally ascites. The urine is scanty; albuminuria is generally slight but occasionally reaches 1·50 gm. Esbach. Most cases react favourably to theobromine associated with small doses of quinine.

The chronic forms are insidious in onset. There is a history of attacks of fever which have been more frequent prior to the appearance of nephritic symptoms. Theobromine-quinine generally effects an improvement though its action is much slower than in the acute cases. Six illustrative cases are described.

The second part of the paper discusses the nature of these cases in the light of observations of patients submitted to malaria therapy with *P. vivax*. In these cases it was not uncommon to find that the blood urea rose as the malaria progressed. Thus in the first observation quoted the blood urea at the time of the 4th febrile attack was 0·35 gm.: at the time of the 9th attack it had risen to 0·75 gm. This phenomenon was not quite constant but it occurred with great frequency among the 28 observations recorded. It is important for the doctor treating cases of malaria to watch the renal functions of his patient and more particularly the urea content of the blood. The neurologist should also pay attention to these matters before submitting his patient to malaria therapy. Quinine is never contra-indicated in these cases: it acts favourably on the malaria as well as on the renal condition to which the malaria has given rise.

N. W.

HELMINTHIASIS.

Précis of Abstracts in this Section.

Faust *et al* (p. 144) estimated the numbers of protozoan cysts and helminth eggs in faeces by various methods. Direct counting in iodine solution of known volumes of the material, and the centrifugal floatation method using zinc sulphate solution of specific gravity 1·180 gave the highest readings. Hsü and Chow (p. 144) give the numbers of helminths (chiefly nematodes) found in 809 autopsies in Peiping. Marseille (p. 145) in Batavia found that, compared with an investigation carried out by Flu in 1918, the incidence of ankylostomiasis has lessened, but that of ascaris and trichuris is unchanged.

Schapiro, Crosby and Sickler (p. 146) checked the Bachman intracutaneous skin test for trichiniasis against the post-mortem examination of 30 per cent. of patients so tested, finding a close correlation between the two [see also this *Bulletin*, 1928, Vol. 25, pp. 470, 963, and 1929, Vol. 26, p. 551.] Roth (p. 146) found the site of election of adult *Trichinella* in the guineapig to be near the junction of the small and large intestines, and Jensen and Roth (p. 147) show that larvae actively bore into striped muscle fibres. Roth (p. 147) examined various muscles of guineapigs fed with larvae in definite numbers. Twenty per cent. of the larvae were found in the masseters, diaphragm and legs.

Bachman (p. 147) considers that in some worm infections there is produced a localized immunity, both humoral and cellular. Absence of eosinophilia in the peripheral blood in the later stages of experimental trichinella infection of pigs may be due to the accumulation of these cells in the intestinal mucosa. [The reader may refer here to Blacklock and Gordon's experiments on metazoan immunity carried out a decade ago. See this *Bulletin*, 1927, Vol. 24, p. 861, and 1928, Vol. 25, p. 252.] Culbertson and Kaplan (p. 148) recognize passive immunity conferred upon mice by specific immune serum from rabbits. The antibody appears to act against ingested maturing larvae in the intestines.

Iyengar (p. 148) shows that in Travancore *Mf. malayi* is more widely prevalent than *Mf. bancrofti*, and is a rural infection. It is transmitted by *Mansonioides annulifera*, which depends for larval development on the waterplant *Pistia stratiotes*. The elimination of this plant is an effective measure of control.

Poynton and Hodgkin (p. 149) give the percentages in which elephantiasis and microfilariae in the blood were found in a community in the Federated Malay States. The endemic infection is with *Mf. malayi*. They discuss the relationship between the probable monthly discharge of embryos from the adult female and the downward spreading lymphangitis which is apt to occur at monthly intervals. They also discuss elephantiasis, intradermal tests and the prevention of filariasis.

Galliard (p. 150) reports that larvae of *W. bancrofti* reached the infective stage in *Aëdes aegypti*. Yao, Wu and Sun (p. 150) found various forms of *Mf. bancrofti* in 28 sandflies dissected at different periods after infective feeds. Complete metamorphosis was not obtained, probably owing to the early death of the sandflies.

O'Connor and Knott (p. 151) describe the pathological appearance in an excised varicose groin gland. These did not support their former conclusions that parturition in the adults is simultaneous and occurs about noon.

Knott (p. 152) has had success in the treatment of elephantiasis of the leg by pressure, first by means of a bandage boot and later, when the condition has improved, by a supporting legging. It is not necessary to remove these during an attack of lymphangitis. For the acute inflammation which often follows surgical interference in elephantiasis, Chabeuf (p. 153) has used septasine with success.

Yen (p. 154) gives the results of a study of the development of the larvae of *Dirofilaria immitis* in various species of Anopheles, Culex and Aëdes. It was completed most frequently in the anophelines. Kubo (p. 155) found a seasonal as well as a daily periodicity in *Mf. immitis* in two dogs in Peiping.

Anderson and Lehucher (p. 155) report the first autochthonous case of cutaneous onchocerciasis in Tunisia.

Southwell and Kirschner (p. 155) detail observations made on the development of guineaworm larvae in *Cyclops vernalis* under laboratory conditions.

Wright (p. 155) considers that the eggs of *Hepaticola hepatica* seen in the faeces of 16 persons in Panama were present through contamination. Daengsvang and Tansurat (p. 156) give frog, fish and eel hosts of *Gnathostoma spinigerum*. Frickers (p. 156) gives the incidence of various helminths (of which *Ancylostoma caninum* was the most common) in 400 dogs destroyed in Surinam. *C. W.*

Faust (Ernest Carroll), d'Antoni (Joseph S.), Odom (Vada), Miller (Max J.), Peres (Charles), Sawitz (Willi), Thomen (Luis F.), Tobie (John) & Walker (J. Henry). **A Critical Study of Clinical Laboratory Technics for the Diagnosis of Protozoan Cysts and Helminth Eggs in Feces. I. Preliminary Communication.**—*Amer. Jl. Trop. Med.* 1938. Mar. Vol. 18. No. 2. pp. 169–183. With 1 fig.

With a view to the accurate estimation of the number of protozoan cysts and helminth eggs in any faecal specimen, accurate quantitative determinations were carried out by a number of different methods. These included direct counting in iodine solution of known volumes of a specially prepared homogeneous emulsion of the material, direct counting in haematoxylin-stained fixed films of known volumes of the emulsion, counting in the deposit after 24 to 48 hours' sedimentation, counting of a centrifuged deposit and counting by the direct centrifugal-floatation method, using zinc sulphate solution (sp.g. 1·180) as the diluting fluid. The highest readings were obtained by the first and last of these methods, the first being slightly better than the centrifugal floatation method. It is especially noted that the zinc sulphate solution is equally suitable for floating protozoan cysts and helminth eggs and with its use concentrations of as high as a thousand-fold may be obtained. Further work on the subject is in progress and the authors expect to be in a position to recommend a simplified practical method for clinical laboratory diagnosis of parasites in faeces. *C. M. Wenyon.*

Hsü (H. F.) & Chow (C. Y.). **Studies on Human Intestinal Helminths in 809 Autopsy Cases.**—Reprinted from *Bull. Fan Mem. Inst. Biol.*, Zool. Ser. 1938. Aug. 20. Vol. 8. No. 3. pp. 245–273. [10 refs.]

These autopsies were made in Peiping from 1921 to 1938 and 78·1 per cent. of the persons had lived in North China.

It is pointed out that parasites may be lost before the death of seriously ill persons, so the figures of parasitism here given may be lower than they were during life. There were 549 males and 260 females. As regards a number of them faecal examination had been made during life. " Our laboratory has been using the direct smear method for the routine stool examination for helminth ova. Usually two samples of stools of different days are required for examination and two smears are made from each sample. Where and when indicated, examinations are repeated and the floatation or other methods are also resorted to." [The particular cases implied have not been traced.]

Ascaris was present in 312 (38 per cent.) of autopsies, during life stool examinations had been made in 149 of them and in 44 no ova had been found, so that the examination detected only 70·4 per cent. of infected persons ; in 3 the worms were immature, in 30 there were only male worms, in 11, one or more mature females were present, as many as 10 males and 6 females in one instance ; the total ascaris bag was 1,260, the highest number 36 and a footnote adds that the local record is now 63. Enterobius was found in 109 (13·5 per cent.) ; with a total collection of 1,560, and a maximum of 575 in one patient, the percentage of infection in both sexes being the same, 13·4 per cent. Trichuris was found in 64 (7·9 per cent.), the total collection was 161, 32 from a girl of eleven being the maximum ; unisexual infection was present in 71·9 per cent. of persons (33·3 per cent. with female worms and 38·6 per cent. with males). *Ancylostoma duodenale* was present in 117 (14·4 per cent.), 1,354 worms in all with a maximum of 522 (270 males and 252 females) in a man of 18, a soldier and not a local man (the local record was 77) ; of these persons 69 had stool examinations during life and in 44 of them no eggs were found ; in 12 of the 25 negatives, only male worms were found, in the others males and 1 to 7 females ; where recorded the sexes of the worms were—males 632, females 680. *Necator americanus* was found in 22 (2·8 per cent.) with a total of 164 worms and a maximum of 31 in a man who lived north of Peiping and had never been elsewhere ; stool examination disclosed only 44·4 per cent. of the infections ; of the 22 cases missed, 8 were unisexual parasitisms, 4 with males and 4 with females ; the total collection was 164 worms, 79 males and 85 females. Taking the hookworm cases together there were 127, on 72 of them stool examinations had been made and no ova were found in 45 so only 37·5 per cent. of them were detected in the laboratory during life. One visitor to the district had 8 *Fasciolopsis buskii*, not discovered in the laboratory ; 4 had *Taenia saginata*, one being diagnosed in the laboratory ; one had *T. solium*, but his stool had not been examined during life. *Clayton Lane.*

MARSEILLE (A.). Over het voorkomen van dierlijke darmparasieten bij de bevolking van een stadskampong te Batavia. [**The Incidence of Intestinal Parasites in a Native Quarter of Batavia.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1938. Sept. 27. Vol. 78. No. 39. pp. 2371–2375. English summary.

" The presence of intestinal animal parasites in the population of a native quarter in Batavia was investigated. [But the total examined was small.]

" The figures obtained have been compared as far as possible with the results obtained in 1918 under similar conditions by FLU. Conclusions from this comparison should be drawn with some reserve as the research technique differs.

"It appears that:

"1. The density of ancylostoma has lessened.
"2. The density of Entamoeba histolytica need not be decreased.
"3. The density of ascaris and trichocephalus remains unchanged.

"On the strength of the fact that the density of ascaris and trichocephalus did not undergo any change, it has been concluded that the direct as well as the indirect "faecal contact" has remained the same in the native homes in Batavia during the last twenty years, but that a change for the better can be observed as regards the special conditions necessary to cause ancylostoma infection."

SCHAPIRO (Mark M.), CROSBY (Benjamin L.) & SICKLER (Margaret M.). **The Correlation of Clinical Diagnosis and Post-mortem Findings in Trichinosis.**—*Jl. Lab. & Clin. Med.* 1938. Apr. Vol. 23. No. 7. pp. 681–687.

"In a study, apparently the first of its kind, on the diagnostic value of the Bachman intracutaneous skin test for trichinosis as checked against the postmortem examination of 30 per cent. of the patients skin tested, the results show a close correlation between skin test findings and post-mortem findings. The skin test may be somewhat more valuable as a negative diagnostic measure than as a purely positive measure."

In a series of 400 persons in whom a routine use of Bachman's intracutaneous skin test was made at the Gallinger Municipal Hospital, Washington, the percentage positive for trichinosis was 18·25. Of the 400 persons, 116 came to necropsy, namely 27 positives (22·4 per cent.) and 89 negatives. Of the 27 positives, the larvae of 12 were shown by the microscope only, of 5 by the Baermann apparatus only, while 7 were positive and 3 were negative to both. Of the 89 negatives, 1 was positive to the microscope only and one both to it and Baermann's test. The three cases positive to the skin test but negative on autopsy may be due to "false positives" or to infections not detected by, and perhaps without presence of larvae in, the 1 gramme of muscle used in the Baermann test. The two false negatives are perhaps due to loss of sensitivity in long-standing and slight infections. At all events the skin test is a valuable help in diagnosis. *C. L.*

BOZICEVICH (John). The Diagnosis of Trichinosis by Immunological Methods.—*Rev. Med. Trop. y Parasit.* Habana. 1938. May–June. Vol. 4. No. 3. pp. 155–157.

HOYNE (Archibald L.) & WOLF (A. A.). Trichinosis: Report of Trichinae in Vocal Cords of a Patient with Diphtheria.—*Jl. Amer. Med. Assoc.* 1938. Aug. 20. Vol. 111. No. 8. pp. 701–702. With 1 fig. [12 refs.]

ROTH (Hans). **On the Localization of Adult Trichinae in the Intestine.**—*Jl. Parasitology.* 1938. June. Vol. 24. No. 3. pp. 225–231.

The guineapig was the experimental animal. The site of election was near the junction of large and small intestines including the caecum. With heavy infective doses this habitat became crowded out and worms were found above and below these limits. The adults lived in the small intestine for 30–37 (and in one case to 50) days, in the caecum for 42 to 55, production of young beginning on the 6th to

8th day. The long-lived ones go on growing and may reach a length of 2·2 mm. for males and 4·8 mm. for females, while in heavy infections they may when sexually mature be dwarfed, 0·6 mm. for males and 1·1 mm. for females. *C. L.*

Jensen (Vilhelm) & Roth (Hans). Zur Einwanderung der Trichinenlarve in die quergestreifte Muskelfaser. [**On the Entry of Trichinella Larvae into Striped Muscle Fibres.**]—*Acta Path. et Microb. Scandinavica.* 1938. Supp. 37. pp. 259–271. With 6 figs. [18 refs.]

Trichinella larvae actively bore into striped muscle fibres and complete their further development in them. These conclusions follow from examinations of six guineapigs infected by mouth with 1,500 to 6,250 measles and killed from 9 to 17 days later. *C. L.*

Roth (Hans). **Experimental Studies on the Course of Trichina Infection in Guinea Pigs. I. The Minimum Dose of Trichina Larvae required to produce Infestation of the Muscles; with an Account of the Potential Productiveness of the Female Trichina.**—*Amer. Jl. Hyg.* 1938. July. Vol. 28. No. 1. pp. 85–103. [21 refs.]

Male guineapigs of about the same weight were fed with trichinella larvae, freed by artificial digestion, in definite numbers and either with or without knowledge of the sex of each larva. Seven test muscles were then digested, namely the masseters, diaphragm, upper portions of front legs, and shanks of hind legs, it having been found that in them is represented about 20 per cent. of the infection. The number of larvae becoming encapsuled varied from 300 to 2,400 for each female larva swallowed, with an average of 1,286, but the commonest numbers lay between 1,500 and 2,000. *C. L.*

Bachman (George W.). **Factors involved in Resistance to Worm Infections, with Special Reference to Trichinosis.**—*Rev. Med. Trop. y Parasit.* Habana. 1938. May–June. Vol. 4. No. 3. pp. 121–125. With 2 plates. [Spanish version pp. 127–131.]

"We may therefore conclude that in some worm infections there is a localized immunity produced by the accumulation of antibodies and cells of the reticulo-endothelial system of the host, which wards off the invasion of the worm and the resorption of its toxic products."

The effects of age and diet, as reported by other investigators, are considered in relation to natural immunity, particularly as to the action of polymorphonuclear leucocytes, macrophages, granulocytes and fibroblasts. In acquired immunity in animals, these same cells are more active and are in greater numbers. In pigs eosinophilia from repeated sublethal doses of trichinous meat has been marked after the first feeds (32 per cent.), accompanied by a high precipitin titre (1–6,000); after the others eosinophilia has rapidly lessened and precipitin has been absent. It is suggested that the absence of eosinophils may be due to their accumulation in the intestinal mucosa so that they form there a bar to penetration by the larvae. *C. L.*

CULBERTSON (James T.) & KAPLAN (Samuel S.). **A Study upon Passive Immunity in Experimental Trichiniasis.**—*Parasitology.* 1938. June. Vol. 30. No. 2. pp. 156–166. [12 refs.]

" Protection against infection with *Trichinella spiralis* is conferred upon mice by the passive transfer to them of a specific immune serum from rabbits. A smaller percentage of mice treated with the immune serum die, and fewer larvae invade the muscles of the treated mice than among control animals. The action of the antibody of the immune serum appears to be directed specifically against the ingested larvae which are maturing to adult worms in the intestine of the infected animals. The results obtained thus far indicate that an immune serum would have little therapeutic value in the later stages of the disease."

C. L.

IYENGAR (M. O. T.). **Studies on the Epidemiology of Filariasis in Travancore.**—*Indian Med. Res. Memoirs. Supplementary Series to Indian Jl. Med. Res.* 1938. July. Memoir No. 30. pp. iv+ 179. With 24 figs. (4 maps) & 12 plates. [56 refs.]

So far as they are held to be of interest to workers on filariasis, the results of Iyengar's work on the Bancroftian and Malayan infections [done from 1931 to 1934 in the State of Travancore, South India, and already reported to that State's Government] are here published.

Using about 12 cmm. of blood taken between 9 p.m. and midnight without conscious selection from 78,763 persons, microfilariae were found in 10,031, namely *Mf. malayi* alone in 6,138, *Mf. bancrofti* alone in 3,829, and both parasites in 64. *Mf. malayi* has by far the wider prevalence, it is a rural infection mostly of sandy coastal areas, but found also in forest settlements or in areas close to forest, and indeed it is suggested that originally it must have been a forest infection. Its present wide prevalence in Northern Travancore results from local conditions which suit the breathing and feeding of the immature stages of its insect hosts of the genus *Mansonioides*. These are so well figured in the monograph that the illustrations alone essentially tell the story, with the floating waterplant *Pistia stratioides* as the knave.

There is shown female *M. annulifera* ovipositing on the underwater surface of a floating *Pistia* leaf and the egg clusters so formed, and there is the report that in nature it is only on these leaves that she will lay her eggs; there is the surface of a pond, in which *Mansonioides* breeds, so covered with floating vegetation, including *Pistia*, that larvae and pupae would have great difficulty in reaching open water to pass the tips of their breathing siphons or trumpets into open air; there are transverse sections of *Pistia* roots showing that they contain large air cavities; photographs of the strong barbed or hooked breathing siphon and trumpet of larva and pupa of *M. annulifera*; sections of *Pistia* roots pierced by these structures; and photographs of the roots under water with larvae and pupae attached to them in this way. In natural conditions the removal of *Pistia* meant disappearance of larvae within 48 hours and in 1,046 ponds which had no *Pistia* in them there were no *Mansonioides* larvae.

The conditions most favourable for the feeding of larval *Mansonioides* are man-made, the steeping of coconut husks in water (an essential preliminary to coir making) which diffuses organic matter on which the larvae feed; and such steeping, *Mansonioides* breeding, and Malayan filariasis correspond in distribution.

The young stages of *Mansonioides* may then be attacked through their food or their air. The conditions which give them such satisfying food are part of the staple industry of that area ; if it were stopped it would be an economic catastrophe. *Pistia* thrives best in stagnant fresh water with a low *p*H, not subject to flooding ; and effective interference to counter these conditions is not promising. But the clearing away of the floating *Pistia* weed from tanks is possible and the strikingly valuable results which have followed this action in the Shertalai taluk of the State have been reported in the later work of Iyengar [this *Bulletin*, 1937, Vol. 34, p. 884] and of Sweet and Pillai [this *Bulletin*, 1938, Vol. 35, p. 766].

In its figures, its 62 tables and its 30 appendices the monograph covers its subject so fully that it must be the subject of constant future reference, and the absence of indexes to these three constituents will be missed. A glance at the maps will show how *Mf. malayi* has a rural and *Mf. bancrofti* an urban distribution, but it will be less easy to find the short appendix which shows that when the former infection was in question the male genitalia were affected in 6 of 1,760 persons, whereas with the latter the numbers were 96 of 1,045. Such a difference must imply some significant difference in habitat, or host's reaction or both. The next step in research will surely be the discovery and description of the adult parasite and of the reticulo-endothelial changes which it induces. Workers in India, in parts of which as is now clear the infection is so rife, cannot afford to be anywhere but in the van of those who seek this knowledge. *C. L.*

Poynton (J. Orde) & Hodgkin (E. P.). **Endemic Filariasis in the Federated Malay States.**—*Bull. Inst. Med. Res. Federated Malay States.* 1938. No. 1. 67 pp. With 4 figs. & 1 coloured plate. [Bibliography.]

In the Federated Malay States infection with *W. bancrofti* is sporadic apart from Singapore ; the endemic infection is with *Mf. malayi*.

The disease is confined to low-lying areas beside rivers with naturally raised banks ; on these the villages are set, with ricefield and swamp on the low land behind them. Where a whole population of 1,398 was examined the percentages of elephantiasis and of microfilariae in the blood were : for males over 10 years 18·2 and 10·8, for females over 10 years 2·9 and 4·5, for children 0·3 and 3·3. The Malayans know that those who work or live in the swamps are the most liable to elephantiasis ; tappers, for instance, start work in the dark and may be most extensively bitten then by the insect carriers belonging to the genus *Mansonioides*. The differences between *Mf. bancrofti* and *Mf. malayi* are recounted ; and the former has been found in immigrants who have been in the country up to 15 years and are unlikely to have been infected since they arrived. It is held as demonstrated by many workers that microfilariae have a life of between two and three months and as probable that the mother worm discharges a fresh batch of young about once a month, thus maintaining in the blood " a supply of embryos in which the proportion of young, mature and old is effectively balanced." Such monthly birth, though there is no proof of it at present, is very probably, so it is held, the cause of the downward spreading lymphangitis, apt to occur monthly and attributable to successive migrations of enormous numbers of the [sheathed] microfilariae through the walls of the lymphatics to the blood stream

by which the walls "become thickened and impassable with the result that the microfilariae die *in situ* and set up an intense local reaction." As to periodicity, the ratio between the numbers of embryos in the blood at midday and midnight is said to be put in general by workers as 1 to 1,000 for *Mf. bancrofti* and 1 to 20 for *Mf. malayi*, while in two cases examined by the writers it was as 1 to 5. [In 4 cases quoted by IYENGAR (see above) the ratio varied from 0 to 2·9 per cent. of the night figures.] Of 322 cases of elephantiasis the condition was confined to the lower limbs in all but two, in them the right hand and scrotum were involved; the youngest ages at which it appeared were 6 and 7. Of 3,689 heavy thick films half an inch across, 327 contained microfilariae; but half of those that were positive showed 5 or fewer embryos so that, as is noted, all positives can hardly have been found. Intradermal tests were made with an antigen obtained by washing *Dirofilaria immitis* in saline, drying, pulverizing, extracting in normal saline, with suitable filtering to ensure sterility. Of 64 persons with elephantiasis the test was positive in 35, of 33 showing microfilariae in 16, of 116 from an endemic area in 38, and of 57 from a non-endemic area in 7. Prognosis is excellent, the enforced leisure being conducive to ripe old age. "Clinical filariasis" at the Pehang river has risen immediately in the year after severe flooding, and this is attributed to delay in getting the padi fields under cultivation, but it is not stated whether the *Pistia* plants, on which *Mansonioides* larvae and pupae depend for air, remain and live on these fields when the flood goes down. For prevention, the moving of dwellings away from swamps has been effective, the draining of swamps over large areas is often an economic possibility, but the destruction or hand removal of *Pistia* round the dwellings of estate labourers at least, so successful in Tranvancore, is not mentioned. *C. L.*

GALLIARD (Henri). Evolution complète de *Filaria bancrofti* chez *Aedes* (*Stegomyia*) *aegypti*. [**Complete Development of** *W. bancrofti* **in** *Aëdes aegypti*.]—*C. R. Soc. Biol.* 1938. Vol. 128. No. 23. pp. 1111–1112.

In *Aëdes aegypti* the larva of *Wuchereria bancrofti* has reached the infective stage.

The workers in whose hands *Mf. bancrofti* has failed to develop at all or to infectivity are enumerated. Galliard reports that on feeding *Aëdes aegypti* and *Aëdes albopictus* on 6 carriers of *Mf. bancrofti* and on two of *Mf. malayi* he obtained success on one patient only and when fed on him, one *Aëdes aegypti* out of 5 showed larvae in the thorax, head and labium after 9 days at 26°–28°C. The *Aëdes aegypti* were all of the same brood. *C. L.*

YAO (Y. T.), WU (C. C.) & SUN (C. Jung). **The Development of Microfilaria of** *Wuchereria bancrofti* **in Sandfly,** *Phlebotomus sergenti* **var.** *mongolensis*. **A Preliminary Report.**—*Chinese Med. Jl.* 1938. Mar. Supp. No. 2. pp. 401–410. With 2 plates.

All of 8 sandflies caught in nature (4 *P. chinensis*, 2 *P. sergenti mongolensis* and 2 of a new species) had microfilariae stated to be *Mf. bancrofti* in their alimentary canal. As to experimental infections,

brought about by feedings on one of two persons, the findings were these.

" Fifty-nine *P. sergenti* var. *mongolensis* bred in the laboratory were allowed to feed on two filarial patients of unequal degrees of infection, with the following results : (1) 17 of them, dissected between 8 hours and 4½ days after the infective meal, were found to harbour exsheathed microfilariae both in their abdominal cavities and in their thoracic muscles ; (2) 7 of them, dissected between 8 hours and 10½ days after the infective feeding, were found to harbour pre-sausage forms in their thoracic muscles ; (3) 3 of them, dissected between 3½ and 6½ days, were found to harbor sausage forms ; and (4) 1 of them, dissected 8½ days after the infective feeding, was found to harbour post-sausage form . . . .

" Sandflies fed on the case having heavy filarial infection were found to die earlier than those fed on case having the lighter infection.

" The failure of the microfilariae to complete their metamorphosis in the present series of sandflies is thought to be due to the untimely death of the insects and to the unfavourable conditions for the development of the larvae under which the experiment was carried out, rather than to their inability to attain their full development in these insects."

C. L.

O'Connor (F. W.) & Knott (James). **Chylous Filarial Lymphatic Varix. A Clinical Pathological Report.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1938. June 25. Vol. 32. No. 1. pp. 125–128.

This report, found among Professor O'Connor's papers after his death, was brought up to date by Dr. Knott. It concerns a negro youth of 17 in whose night blood microfilariae were present.

He had a swelling in the left groin which had begun when he was six, and which had become painful five days ago ; this was his first inflammatory attack. The swelling measured 5½ by 2¾ in., collapsed on pressure disclosing nodes and tubes, and filled on coughing or standing. Aspiration showed chylous fluid with some microfilariae. It was removed by Knott at 2.45 p.m. on 28th October, 1935. A sharp lymphangitis appeared in May 1937, but he remained free from further attacks up to March 1938, the date of report. Other enlargements of cord, epididymis and inguinal nodes persisted, and he still had microfilariae in the blood.

" The clinical manifestations of chylous lymphatic varix are shown to be filarial in origin, in that they are associated with advanced pathological changes in the neighbourhood of ten adult *W. bancrofti*. In previous reports (O'Connor and Hulse, 1932 ; and O'Connor and Hulse, 1933) there was evidence that parturition of female *W. bancrofti* is simultaneous and occurs about noon. That development in utero is simultaneous is borne out by the present study, but that parturition always occurs about noon is not upheld by the present findings, although it seems to have been imminent at the time of operation. In some previous instances microfilariae, living or degenerating, have been found in lymphatic glands in the neighbourhood of parent female *W. bancrofti*, and where such parasites were present there was marked evidence of glandular disease ; in the present one, although there is extensive evidence of varicosity of the sinuses, the gland substance appears to be healthy ; the very enlargement of the sinuses may therefore facilitate the passage of embryos through otherwise undamaged glands. In filariasis (where there is great variation of pathological signs, not only in different persons but in different parts of limited portions of tissue from the same person) intensive study along the present lines seems indicated by observers in various countries on all kinds of filarial material that may be available." *C. L.*

KNOTT (James). **The Treatment of Filarial Elephantiasis of the Leg by Bandaging.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1938. Aug. 25. Vol. 32. No. 2. pp. 243–252. With 3 figs.

"Prolonged firm bandaging effects a gradual removal of the lymphoedema in filarial elephantiasis of the leg; the patient gets prompt symptomatic relief from his discomfort and recurrent attacks of lymphangitis cease."

The paper gives Knott's experience of 105 unselected patients with elephantiasis of the leg seen during 10 months and treated by pressure. These pressure methods allow of the building up of a large out-patient clinic, and they are varied with circumstances. Ordinarily the bandage boot is used, consisting of a 6 in. wide bandage of heavy Turkish towelling covering the limb from just behind the heads of the metatarsal bones to the heads of tibia and fibula, cemented to a covering crêpe bandage by dextrin syrup applied along the tibia, the whole being supported, in legs which do not curve in above the calf, by narrow lateral splints. The boot should be applied so tight as to make the toes cyanotic; cyanosis disappears on walking as soon as movement forces lymph upwards. When the limb shrinks a new boot may be applied, to be replaced by a supporting legging when no further oedema remains. This emptying of the leg of oedema may be accompanied by its disappearance from the thigh, but when there is much

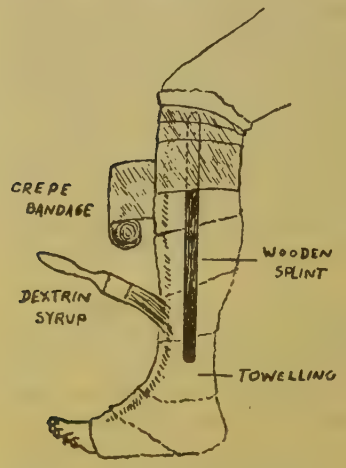


Fig. 1. The "bandage boot"—a cotton elastic-weave crêpe bandage applied over bath towelling, with the turns of the bandage glued together with dextrin.

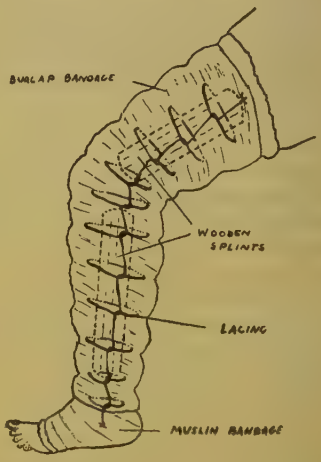


Fig. 2. The "burlap bandage" for larger legs—made from rice or sugar bags cut into 6 inch wide strips and wrapped round the limb over the bath towelling. Lacing is sewn on the burlap to give compression.

[Reproduced from the *Transactions of the Royal Society of Tropical Medicine and Hygiene.*]

enlargement involving the thigh it too will need compression. If this were done by crêpe bandages, it would need six or eight at a prohibitive cost for such a clinic ; so, after covering the limb with towelling and the foot with a muslin bandage, the limb from the ankle upwards is wrapped in two or three layers of burlap cut from rice or sugar bags into 6 inch wide strips, and lacing is run into this, by which it can be tightened as needed, a widish splint having been put in over the towelling and under the spot where the lacing will later come, so that the formidable needle required to introduce the lace will have no chance of running into the limb. For the details, the original, with its clear diagrams should be read. For prognosis as to the amount of reduction to be expected by pressure, a soft texture of the skin is good, but even when there is warty thickness there is remarkable improvement, the skin softening and its excrescences disappearing. Patients have had attacks of the usual lymphangitis while the leg was being reduced but none has had any such since it was completed, though, as is noted, only time can show whether there is complete cessation.

" Further we have learned not to remove the bandages when an attack of lymphangitis comes on. The patient elevates the foot of his bed and stays there until the fever is over, usually for 2 to 3 days ; the bandages keep the leg from swelling and the lymphangitis is confined to the thigh, where these attacks seem to originate. A pyogenic infection such as a paronychia or an infection in a crack between the toes, is a different affair, however, for here the foot and leg will swell and the bandages must be removed ; the swelling caused by such an infection is slow to be reduced again. A patient who has been having frequent recurrent attacks of lymphangitis and whose leg is in a stage of progressive enlargement does not show so prompt a reduction with bandaging as does a patient whose leg is in a stationary stage."

If further reduction is necessary by operation, this is greatly eased by now having a small leg to deal with, and the skin flaps are tailored to fit without tension. " It is important not to remove too much tissue ; it is better to do a second operation than to have a slough of skin." The part which suspension of the limb, with the foot of the bed raised, plays in easing acute attacks and as part of the post-operative routine is made clear with the aid of diagrammatic illustration.

C. L.

CHABEUF (M.). La chimiothérapie antistreptococcique dans les " filarioses " lymphatiques au Cameroun. [**Antistreptococcic Chemotherapy in Lymphatic Filarial Lesions in the Cameroons.**]—*Bull. Soc. Path. Exot.* 1938. May 11. Vol. 31. No. 5. pp. 429–436.

In the treatment of acute inflammation often coming on after surgical interference in elephantiasis and varicose lymph nodes, septasine has proved valuable. Two grammes are given daily *per os* for five days and 10 cc. soluseptasine intravenously on the first day.

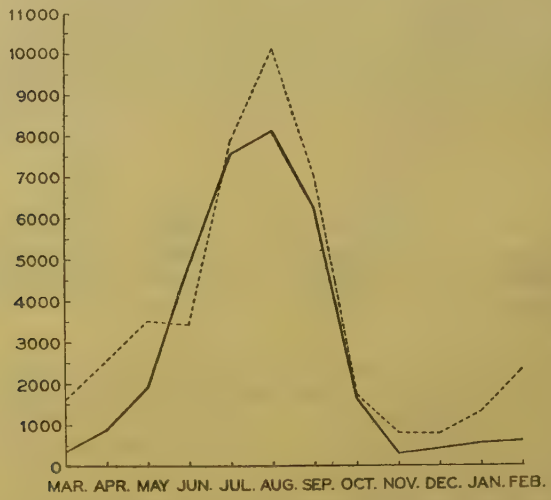
In three cases operations were performed for elephantiasis of the penis and scrotum ; acute inflammation came after operation in two and before it in one, and subsided under septasine. The same post-operative result followed in two of three persons in whom varicose lymph nodes were excised from the groins and yielded to the same

treatment. There appears to have been no bacteriological examination and no search for microfilariae in the blood in any case. In a seventh case an opened hydrocele displayed what was held to be an adult filaria of undetermined species; the wound did not heal by first intention and 12 days later the pus contained streptococci and staphylococci and septasine had no effect on the suppuration. [Septasine (benzyl-amino-benzene-sulphamide) is prepared in tablets of 0·5 gm., the dose, *per os*, being 4 to 8 tablets daily. Soluseptasine (see CHOPRA and DAS GUPTA, this *Bulletin*, 1938, Vol. 35, p. 900) is prepared in 6 per cent. solution, the dose being 10 to 20 cc. intravenously or intramuscularly daily.] *C. L.*

YEN (Chia-hsien). **Studies on *Dirofilaria immitis* Leidy, with Special Reference to the Susceptibility of Some Minnesota Species of Mosquitoes to the Infection.**—*Jl. Parasitology.* 1938. June. Vol. 24. No. 3. pp. 189–205. [13 refs.]

Mosquitoes were caught wild and fed on an infective dog in Minnesota, with the following results :—

Many larvae completed their development in *Anopheles maculipennis* and *A. punctipennis*; a few did so in *Culex territans*, *C. tarsalis* and *C. pipiens*. In other mosquitoes some larvae completed development and some died with pigment encapsulation: in *Aëdes vexans* encapsulation may be deferred till the preinfective (second larval) stage, in *A. stimulans* and *A. cinereus* the larvae may get as far as the sausage stage, in *A. canadensis* not beyond that of microfilaria; as to others, in *Theobaldia inornata* and *Taeniorhynchus perturbans* larvae reach the malpighian tubules and there die, and in *Aëdes trivitatus* they never leave the gut. *C. L.*



Total number of microfilariae present in the peripheral blood of 2 dogs over the period of the whole day. [See KUBO's abstract, p. 155.]

[Reproduced from the *Chinese Medical Journal.* Supplement.]

KUBO (M.). **The Daily and Seasonal Periodicity of *Microfilaria immitis* in the Peripheral Blood of the Dog.**—*Chinese Med. Jl.* 1938. Mar. Supp. No. 2. pp. 375–384. With 13 figs.

In two dogs examined in Peiping, with its great seasonal differences in temperature, there was a seasonal as well as a daily microfilarial periodicity.

At fortnightly intervals there were made on each dog two-hourly examinations of three specimens each of 20 cmm. blood got by a fresh wound in the ear, beginning at 11 a.m. and ending at 9 a.m. next day. The ebb of the microfilarial blood tide was more complete than it often is in Dirofilaria infection, though this is perhaps more apparent than real, the maximum numbers themselves being relatively low. Adding together the total number of microfilariae counted in these twelve two-hourly examinations, there was a most marked seasonal difference (*v.* Fig.), the daily maximum (in August) being twenty times greater than in the winter (November to March). *C. L.*

ANDERSON (C.) & LEHUCHER (P.). Note préliminaire sur le premier cas autochtone d'onchocercose cutanée observé en Tunisie. [**The First Autochthonous Case of Cutaneous Onchocerciasis in Tunisia : a Preliminary Note.**]—*Bull. Soc. Path. Exot.* 1938. July 6. Vol. 31. No. 7. pp. 655–658.

SOUTHWELL (T.) & KIRSCHNER (A.). **Some Observations on Guinea-Worm Larvae.**—*Ann. Trop. Med. & Parasit.* 1938. Aug. 2. Vol. 32. No. 2. pp. 193–196. [21 refs.]

The observations were carried out at room temperature, 17°C., in February in Liverpool because then only was the material available.

Few cyclops could be got, and as one or more were killed daily the stock failed before the larvae became infective ; this may have been due to *C. vernalis* being a non-optimum host though most of the larvae were found in it. In tap water cyclops died in 6 hours, in pond water some died each day and the life span did not exceed 9 days ; for 4 days they were very active and became progressively less so. The larvae are eaten by cyclops, as many as 20 in 15 minutes. If now one draws out the alimentary canal of the host, larvae can be seen piercing the stomach wall, and the larva's intestine, until now clear and empty, is seen to contain granular material which becomes denser as life in the host's body cavity goes on. Cyclops have remained alive and active with 10, 12 and 15 larvae in them. Up to 22 days there was no clear development ; then the tail became constricted off, and began to wither away in the 6th week, the beginning of moult 1 ; while detachment of the cuticle at the tail end appears to be the signal for the start of moult 2. Here the material gave out. *C. L.*

WRIGHT (Harry E.). **Further Observation on the Incidence of *Hepaticola* (*Capillaria*) *hepatica* Ova in Human Feces.**—*Amer. Jl. Trop. Med.* 1938. May. Vol. 18. No. 3. pp. 329–330.

In New San Juan, a Panama village, the eggs of *Hepaticola hepatica* were found in 16 of 194 faecal specimens examined. Ten were negative 10 days later, an occasional egg was found in another. It is concluded that the eggs were due to contamination as suggested by FAUST and MARTINEZ from examinations on the same villages [see also this *Bulletin*, 1931, Vol. 28, p. 208, 209]. *C. L.*

DAENGSVANG (S.) & TANSURAT (P.) **A Contribution to the Knowledge of the Second Intermediate Hosts of *Gnathostoma spinigerum* Owen, 1836.**—*Ann. Trop. Med. & Parasit.* 1938. Aug. 2. Vol. 32. No. 2. pp. 137–140. With 1 fig.

"Naturally encysted gnathostome larvae were discovered in 91·67 per cent. of frogs, *Rana rugulosa* Wiegmann; in 80 per cent. of eels, *Monopterus albus* (Zuieuw); in 37·5 per cent. of *Ophiocephalus striatus* Bloch; and in 30 per cent. of *Clarias batrachus* (Linnaeus)."

[The last two are freshwater fish.] The range of second intermediate hosts includes then frog, fish and eel. *C. L.*

FRICKERS (J.). Het voorkomen van *Dipylidium caninum* (Linné 1758); *Toxocara canis* (Werner, 1782); *Ancylostoma caninum* (Ercolani 1859); *Dirofilaria immitis* (Leydi 1856); en *Spirocerca sanguinolenta* (Rudolphi 1819) bij den hond (*Canis familiaris*) in Suriname. [**The Incidence of *Dipylidium caninum* and Other Helminthic Infestations in Dogs in Surinam.**]—*Tijdschr. v. Diergeneesk.* 1938. Sept. 15. Vol. 65. No. 18. pp. 921–924. English summary (4 lines).

The author, who is the Government veterinary surgeon of Paramaribo, examined the intestines of four hundred dogs which had been destroyed in Surinam. A large proportion of them harboured worms. *Ancylostoma caninum* was the most common and was found in 363, or 90·8 per cent., even in the first months of life; *Spirocerca sanguinolenta* came next in frequency, 266, or 65 per cent., being infested, the degree increasing with age from 22·2 per cent. below four months to 90 per cent. at 8 years and over. *Dirofilaria immitis* was present in 112 (28 per cent.), also increasing with age; none was found in those under 4 months old, 2·4 per cent. from 4–5 months and 8 out of ten at 8 years of age. *Dipylidium caninum* was found in 45 only (11·25 per cent.), mostly at 4–5 months when 10 were positive out of 41; at other ages the percentage ranged between 3·7 and 12·6. Lastly, *Toxocara canis* was found in 32, or 8 per cent., almost all in young animals, 12 out of 27 under four months but in one only of 68 at 18 months. *H. H. S.*

SARLES (Merritt P.). The in Vitro Action of Immune Rat Serum on the Nematode, *Nippostrongylus muris*.—*Jl. Infect. Dis.* 1938. May–June. Vol. 62. No. 3. pp. 337–348. With 17 figs.

MISCELLANEOUS.

MANSON-BAHR (Philip). **The Action of Sulphanilamide on** *Brucella abortus* **Infections.**—*Practitioner.* 1938. June. Vol. 140. No. 6. pp. 740–742. With 1 fig.

The author describes three cases of abortus undulant fever. In each the serum agglutinated both *Br. abortus* and *Br. melitensis* and in two the intradermal test was positive. Treatment with sulphanilamide was commenced after about six weeks of illness in two and after four months in the third (whose principal sign of disease was acute orchitis). The dose was 1·5 gm. daily by the mouth and this was strikingly successful in reducing the fever and the enlargement of the spleen. A single relapse occurred in each of the first two patients which yielded to further sulphanilamide, administered in the second case by deep subcutaneous injections of 5 cc., one each day for 6 days.

The effect on the temperature was too striking to be coincidental. The small terminal bout of fever noted on cessation of sulphanilamide treatment need not be regarded as a definite relapse, but as the natural termination of the infection. [See also this *Bulletin*, 1938, Vol. 35, p. 826.] *C. W.*

TRAUT (E. F.) & LOGAN (Catharine Elizabeth). **Undulant Fever treated with Sulfanilamide.**—*Jl. Amer. Med. Assoc.* 1938. Sept. 17. Vol. 111. No. 12. pp. 1092–1093.

Two patients suffering from undulant fever were treated with sulphanilamide in 1937. The first was engaged in work which entailed the handling of both raw pork and beef. On admission to hospital after three weeks of fever his serum agglutinated the bovine and porcine forms of *Br. melitensis* up to 1 in 1,280 dilution. After the failure of stock brucella vaccines to influence the condition, sulphanilamide was given for nine days with excellent results, the temperature being reduced to normal after the second day.

The second patient, a woman of 69, had been ill for eight weeks and had become very anaemic, finally developing jaundice and a stuporose condition. Her serum agglutinated *Br. melitensis* in 1 in 15,000 dilution. After a blood transfusion, 30 grains of sulphanilamide (prontylin) was administered daily [it is not stated for how long] and within 48 hours she was free from fever. The cure in both patients is apparently permanent. *C. W.*

GEAR (James). **Onyalai: a Form of Purpura occurring in Tropical Africa. Report of Cases occurring in South Africa.**—*South African Med. Jl.* 1938. Sept. 10. Vol. 12. No. 17. pp. 632–637. With 2 figs.

Onyalai, a disease of obscure origin and pathology, engendering fear in the African native owing to its sudden onset and high fatality rate, has been observed since F. C. WELLMAN first wrote of its occurrence in West Africa in 1904. In the present paper the author records seven cases occurring in South Africa; three ended fatally and the post-mortem findings are noted. Among the patients was one woman, and the ages ranged between 20 and 40 years. The symptoms were

practically the same in all: sudden onset with feeling of lassitude. then soreness of the tongue, gums and buccal mucosa with rapid formation of "blood blisters" and profuse haemorrhage from the mouth, nose, and blood-filled blebs or petechiae on the surface of the body; passage of blood in urine and faeces also occurs. The blood-filled bullae vary in size from that of a pea to 1½ inches in diameter. The eyes and face are suffused and swollen and the parotid glands are enlarged and tender. Treatment by haemostatics is of little avail; the anaemia is profound and in fatal cases death takes place usually within a week. The best treatment which, when it succeeds does so rapidly, is intramuscular injection of 20 cc. citrated whole blood.

At autopsy, all the organs and tissues show petechiae (in one of the author's cases a large cerebral haemorrhage was the immediate cause of death), the spleen is a little enlarged and friable. An instructive table giving the results of laboratory investigations in the seven cases shows that in the average case there is but little change from the normal in the number of erythrocytes or leucocytes—in fatal cases, naturally, there is a severe drop in the former—and the colour index varied from 0·85 to 0·98 in those who recovered. The bleeding time was prolonged, but coagulation time showed little if any departure from the normal; the chief characteristic was marked reduction to almost complete absence of platelets. In two cases examined megakaryocytes were present in normal numbers in the bone marrow and there would, therefore, seem to be an inhibition of the normal maturation of platelets. Intravenous blood-transfusion is less efficient in treatment than smaller amounts intramuscularly, which suggests a deficiency of some factor in normal whole blood which stimulates platelet formation and maturation when in contact with the tissues. [This is rather an alternative form of statement of what has been found than an explanation of the pathogeny.] Prior to the onset of illness the patients had generally been in good health and living on a liberal mixed diet. Further investigation of cases and experimental work are called for and will be awaited with interest. *H. H. S.*

HELLMAN (J.). **Onyalai.** [Correspondence.]—*South African Med. Jl.* 1938. Oct. 8. Vol. 12. No. 19. p. 742.

Referring to the above article, Dr. Hellman tells of five cases of the same, or closely similar, condition seen by him among Hottentots in the Kalkfontein area. [In the atlas, two places named Kalkfontein are mentioned, about 150 miles apart, one in Griqualand West, the other in Prieska.] Of these, three were women between 55 and 65 years, and two were men of 40–45 years. As in Dr. Gear's cases, the onset was sudden. Thinking the condition was scorbutic, Dr. Helman prescribed orange juice and an antiscorbutic diet, but unavailingly; autohaemotherapy—20 cc. injected intramuscularly—was followed by rapid recovery and two of the patients received only one injection. In three it had to be repeated, but only once, it would appear from the report. So far none has had any return of the symptoms, though the first occurred more than three years before. [This communication deals purely with the clinical aspect; no laboratory examinations were carried out, so the author does not venture to offer any suggestions as to the pathogeny of the condition.]

H. H. S.

SNELLING (John G.). **Thrombocytopenic Purpura. Three Case Reports.** —*New Orleans Med. & Surg. Jl.* 1938. Nov. Vol. 91. No. 5. pp. 231–235. [23 refs.]

This article is of particular interest in that, though no mention is made of the fact nor even any reference to the condition, the disease described bears many very remarkable points of similarity to *onyalai*. Apart from the profuse haemorrhages in skin, and from mucous surfaces—mouth, nose, rectum, etc.—the blood conditions show many points in common. Thus the "cardinal hematologic findings in thrombocytopenic purpura are: (1) Marked decrease in platelets; (2) normal coagulation time; (3) prolonged bleeding time; (4) delayed contractility, or non-retractile clot; (5) positive constrictor test."

Referring to Dr. GEAR's article abstracted above, we see that the first three of these are common to onyalai and to thrombocytopenic purpura; the fourth and fifth are not mentioned. Other features common to both are the sudden onset and the splenic condition. On the other hand, of three cases detailed in Dr. Snelling's paper, two were children, 5 and 7 years of age, the other was aged 20 years, and all were females, whereas in the few recorded cases of onyalai males predominated and the ages of the patients were usually between 20 and 40 years.

The author reviews the literature of idiopathic purpura and discusses the use of snake venom in treatment and where that and transfusion of blood fail he has found splenectomy very successful. Onyalai runs, when fatal, too acute a course for trial of tentative remedies, and, as seen in Gear's article, autohaemotherapy with comparatively small amounts (20 cc.) proved very effectual, whereas transfusion of larger amounts did not. [Further study of these two—if they are two—conditions might reveal findings of great importance and it would be of much interest to observe the effects of small injections of the patient's whole blood intramuscularly in cases of thrombocytopenic purpura. Cases of onyalai showed no relapse, though one was kept under observation for three years (see HELMAN above).] *H. H. S.*

DUTTON (L. O.). **Thrombopenic Purpura due to Food Allergy.**—*Jl. Amer. Med. Assoc.* 1938. Nov. 19. Vol. 111. No. 21. pp. 1920–1921.

A further case of thrombocytopenia associated with symptoms resembling those of onyalai, but not so severe as those seen in the latter, is reported here for two reasons: (1) In order that a dietetic origin may be looked for in onyalai cases; (2) That a simpler treatment than splenectomy may be tried in thrombocytopenic purpura. If the results are beneficial, much good will have been done; if the attempt is ineffectual, no harm will have resulted and the distinction of the two diseases from one another may be established.

SQUIRE and MADISON nearly two years ago (January, 1937) reported three cases of thrombocytopenic purpura associated with, probably due to, food allergy. The case recorded by the author is that of a white woman of 59 years who had suffered on and off for years from purpuric symptoms—ecchymoses, petechial haemorrhages, epistaxis, haematuria—with marked reduction of platelets, down to 60,000 per cmm. The allergy appeared to be due to citrus fruits, and when these were excluded no fresh spots were seen and the old ones cleared

completely in ten days and the platelet count rose to 240,000. When small amounts of citrus fruits were cautiously added to the diet, fresh ecchymoses appeared in three days.

The author comments that "at least an unknown percentage of persons suffering from this disease [thrombocytopenic purpura] might be relieved by a much simpler procedure than radical splenectomy" and "it is amazing that a shock organ could be so narrowly limited that only the cells responsible for the platelet formation in the bone marrow could be affected by an allergen." *H. H. S.*

MEDICAL AND SANITARY REPORTS.

Kedah (1937).

Kedah, a Malay State under British protection, lies on the west coast of the Malay Peninsula. It is bordered on the interior by Siam and Perak, and includes the island of Langkawi and a number of smaller islands to the south. The mainland is about 105 miles long and about 65 miles wide at its widest part. Its area, including the Langkawi group of islands, is about 3,648 sq. miles.

Vital Statistics.—The data relating to population, births, deaths, etc., continue to be presented in great detail in a number of tabular statements (see comments below). As mentioned in the 1938 *Supplement* to this *Bulletin*, deaths in early life appear to be a feature of Kedah mortality experience ; during the year under review approximately 50 per cent. of the total deaths registered occurred at ages 0–20 years, and no less than 45 per cent. in the 0–5 age-group alone. The principal facts for the State as a whole read as follows :—

Race	Population	Births	Birth Rate	Deaths	Death Rate	Infant Deaths	I.M.R.
Malays ...	319,260	11,654	36·5	6,265	19·6	1,480	127
Chinese ...	85,472	3,748	43·8	1,914	22·4	505	135
Indians ...	56,402	2,007	35·6	1,407	24·9	432	215
Non-Asiatics	631	7	11·1	1	1·6	—	—
Others ...	13,010	248	11·4	194	14·9	21	85
Totals ...	474,775	17,664	37·2	9,781	20·6	2,438	138

As regards *Estate Populations* the relevant data are set out in similar fashion for purposes of comparison, *viz.* :—

(*a*) *European Holdings.*

Race	Estate Population	Births	Birth Rate	Deaths	Death Rate	I.M.R.
Malays	5,756	69	12·0	21	3·6	203
Chinese	1,805	31	17·3	13	7·2	129
Indians	36,112	1,389	38·5	903	25·0	261
Javanese ...	61	—	—	—	—	—
Others	108	1	9·3	1	9·2	—
Totals	43,842	1,490	33·9	938	16·8	255

(*b*) *Asiatic Holdings.*

Race	Estate Population	Births	Birth Rate	Deaths	Death Rate	I.M.R.
Malays	7,559	25	3·3	17	2·3	160
Chinese	3,091	15	4·9	9	2·9	6·7
Indians	2,287	28	12·2	26	11·4	107
Javanese ...	44	—	—	—	—	—
Others	80	—	—	—	—	—
Totals	13,061	68	5·2	52	3·98	273·8 (? see below)

With regard to the above data relating to population on Estates it should be added that though numerous tabulations of facts are supplied, some of the calculated rates appear to be incorrect, and in other cases discrepancies are noted between different statements relating to similar facts. For example, in Table XXI.B the crude birth rate on Asiatic Holdings is given as 20·4 per 1,000, but the 68 births related to a population of 13,061 give a birth rate of 5·2 per 1,000. In Table XV.D dealing with Asiatic mortality data, the crude death rate is published at 16·5 per 1,000, but 52 deaths related to a population of 13,061 give a death rate of 3·9 per 1,000. Table XV.A gives the deaths on Asiatic Holdings as 28, but Table XVI records them as numbering 52. The infant mortality rates on Asiatic Estates do not appear to be convincing; three specific rates are quoted in Table XXI.B as 160, 107 and 6·7 respectively, yet the gross rate for all nationalities is given as 273·8 per 1,000 births. As a matter of fact on the basis of data supplied in Table XV.A the specific rates for Malays, Indians, and Chinese are 200, 214, and 67 respectively, and the rate for all communities 176 per 1,000 births. The Report observes "Figures for Asiatic Estates are known to be inaccurate." This remark is presumed to relate to the raw data supplied from these sources, and not to the arithmetic applied to the facts for the calculation of rates.

The usual statement dealing with the health of *European Officials* seems to have been omitted from the Report under review.

Maternity and Child Welfare Work.—It is stated that though it is yet too early to seek the benefits resulting from the introduction of the *Kampong Midwifery Service* (see this *Bulletin*, 1938, Supp. p. 189*), yet a most successful beginning has been made. The four locally trained midwives posted to kampongs will have an uphill fight before they completely overcome the conservatism of Malay women and succeed in combating the opposition of the old *bidans* but strenuous efforts are being made to surmount these and other difficulties. Four more midwives are to be posted to kampongs and four new pupils are to commence their training. In addition to the introduction of this service, with a view to the improvement of Midwifery practice, the new *Midwives Enactment* aims at the control of midwifery by the establishment of a system of compulsory registration and organized supervision; so far the new law applies only to the three largest towns, *viz.*, Alor Star, Sungei Patani, and Kulim.

The work of the Lady Medical Officer in charge of Maternity and Child Welfare has again proved of immense value; the record of the year's work reads as follows :—

Item	Women's and Children's Clinics		
	General Hospital	Town Dispensary	Other Dispensaries
First Visits	891	2,102	—
Subsequent Visits	761	3,209	—
Injections (for Yaws) ...	2,107	—	294

School Hygiene.—The provisional approval of Government has been obtained sanctioning the appointment of an additional Assistant Health Officer, primarily intended for general health work in North

Kedah, but concentrating his activities upon laying the foundations of a regular School Medical Inspection Service. During the year under review all Malay Vernacular Schools not visited in the preceding year were inspected; in the course of these visits opportunities were used for giving brief talks on health matters to school-children. Various recommendations were made with a view to improving the sanitary conveniences of school premises and for remedying minor defects. Three Chinese schools were visited and inspected at the request of the Registrar of Schools; Chinese schools are not subject to the routine visits paid by the Medical Department. Upwards of 5,000 school-children were examined in nine districts and 206 of them were found to have enlarged spleens; spleen rates ranged from *nil* to 13·3.

As regards the volume of work dealt with in connexion with the School Medical Service it is noted that 39 Malay Vernacular Schools, and 4,690 school-children were inspected: 3 non-Government Chinese Schools and 189 children were inspected. The principal defects recorded during the medical examination of school-children may be summarized as follows:—

Defects	Percentage of defects recorded in:—	
	Malay Vernacular Schools	Non-Government Chinese Schools
	Per cent.	Per cent.
Caries: Class I	9·5	10·6
,, ,, II	8·7	7·1
,, ,, III	7·3	15·3
Scabies	5·9	4·7
Eye diseases	0·3	3·5
Enlarged spleen	4·1	1·2
Anaemia	1·9	2·4
Yaws	1·7	*nil*
Not vaccinated	2·1	5·9

Public Health, Sanitation, etc.—The various increases in Departmental staff necessitated by the reorganization of Medical Services (see this *Bulletin*, 1938, Supp. p. 190*) received the approval of Government; new services provided or contemplated are mentioned in appropriate sections of the present Summary. Malaria control work in the three principal towns continued along lines previously described; in rural areas where anti-larval measures are impracticable, drug prophylaxis was continued.

In the nine Sanitary Board areas (see this *Bulletin*, 1938, Supp. p. 190*) little has been done to improve methods of *sewage disposal*. Considerable attention was devoted to the improvement of *water supplies* during the year, schemes envisage the provision of filtered and chlorinated supplies to all the large towns and extension of supplies to rural dwellers. These schemes can only be developed with the gradualness of time. As regards *housing and town planning*, it is stated that in the larger towns considerable demolition of old and insanitary houses was carried out during the year, and that building layouts have been prepared for use in both large and small towns. Certain areas have been gazetted so that future building can be controlled.

Health conditions on estates, mines, etc., continued to receive attention, and the Health Board Scheme applicable to such properties

functioned smoothly. All European Estates were visited at least once during the year, but it is again noted that a large amount of extra work was entailed in the supervision of Asiatic Estates owing to the obstruction of the majority of owners. Improvement in housing conditions, sewage disposal, water supplies, etc., on various estates is recorded.

Quarantine restrictions were applied against the arrival of passengers and various commodities from Siam on account of cholera. Railway passengers subjected to routine inspection at Padang Besar numbered 12,756.

Hospitals, Dispensaries, etc.—A considerable amount of building and general activity featured the year under review. The new schemes of work envisage the provision of a Dental Clinic and Tuberculosis Department at the General Hospital, Alor Star, provision of a Venereal Diseases Clinic as a branch of the Town Dispensary, Alor Star, new dispensaries in three areas, structural additions to various hospitals, etc.

Further extension of the chain of *kampong* dispensaries will ensure that the whole of the rice-growing population in North Kedah will shortly be provided for; similar provision for the remoter areas of Central and South Kedah are also under consideration.

The *training of dressers* has now been brought into line with the schemes of work followed in the Straits Settlements and Federated Malay States. One dresser is to attend the Pharmacy course at the Singapore College of Medicine, and one Health Inspector is attending the course of study leading up to the Diploma of the Royal Sanitary Institute.

As regards the volume of work dealt with at medical institutions providing for the needs of the general public and Government Officials, the following details have been extracted :—

Hospital	In-patients			Out-patients		
	Beds	Treated	Died	New Cases	Re-visits	Totals
Alor Star	300	6,952	325	10,208	2,856	13,064
Sungei Patani ...	300	6,729	298	7,048	1,485	8,533
Baling	35	347	13	3,548	1,042	4,590
Kulim	210	4,876	230	9,399	2,444	11,843
Langkawi	70	498	23	3,230	501	3,731
Prison Sick Wards.						
Alor Star ...	?	129	—	1,291	4,991	6,282
Sungei Patani ...	?	—	—	120	698	818
Totals ...	915	19,531	889	34,844	14,017	48,861

The Dispensary Records read :—

5 Outdoor Dispensaries, Alor Star	31,501	14,649	46,150
1 ,, Dispensary, Sik (Central Kedah)	3,447	394	3,841
1 ,, ,, Bandar Bahru (S. Kedah)	2,175	364	2,539
1 ,, ,, Padang Masirat (Langkawi)	770	46	816
4 Motor Travelling Dispensaries (1 each District)	20,793	2,738	23,531

The above details refer to State Hospitals. The medical requirements of the large labour forces on rubber *estates* are met by the Health Board organization; hospitals maintained by the Health Board groups accommodate a total of 1,063 beds. Each hospital has an outdoor dispensary. To Group Hospitals on European Estates 22,679 patients were admitted and 717 died, the corresponding figure for hospitals on Asiatic Estates being 955 and 20 respectively. The notes which follow summarize the principal references to morbidity experience during 1937 taken from the Report under review.

No case of *cholera* or *plague* was reported. The cholera epidemic in Siam gave rise to considerable anxiety and special precautionary measures were taken (see *Quarantine* above). No anti-plague measures have ever been enforced though rats are found in abundance in all centres of population.

Fifteen cases of *smallpox* were reported from South Kedah, four of them terminating fatally. The first case (a Chinese woman newly arrived from China; all other cases occurred among Malays on a rubber estate) occurred on June 28th, and the last on July 24th. A special vaccination campaign was instituted and 27,400 estate employees were vaccinated; total vaccinations in the State numbered 41,333.

A prolonged epidemic of *measles* occurred chiefly on estates, and among Indian labourers; the infection was introduced by newly arrived Indian labourers. Notified cases numbered 1,443 and 26 deaths were ascribed to this cause. It is said that a considerably larger number of deaths occurred, certified as due to broncho-pneumonia which should have been assigned to measles. One fatal case (an Indian) of *tropical typhus* was recorded.

No epidemic of *malaria* was recorded, cases dealt with show an increase over the 1936 figures but fewer deaths were assigned to the disease, the recorded facts being 7,007 cases and 580 deaths. On the other hand deaths ascribed to "*fevers unspecified*" numbered 3,494, so that this title becomes responsible for 36 per cent. of the total deaths in the State due to all causes. As regards malaria on estates 13,164 cases of malaria and unspecified fever, and 67 deaths were recorded. The majority—12,545—of the cases occurred on European estates, but while on European holdings deaths due to malaria constituted 6 per cent. of the total deaths due to all causes, on Asiatic estates the corresponding ratio stood at 25 per cent. With regard to the data relating to Asiatic holdings the Report adds "It is impossible to consider these figures as of any value whatever for statistical purposes."

Of *enteric fever* 69 cases and 10 deaths were notified, and of *dysentery and diarrhoea* 520 cases with 370 deaths; it is also stated that in State hospitals 244 patients were treated for dysentery and 16 died, and in Group Hospitals (estates populations) 312 patients were admitted and 33 died [*i.e.*, a total of 556 in-patients alone treated for dysentery.]

Mention has been made of the proposed establishment of a *Tuberculosis Department* at the General Hospital, Alor Star (see *Hospitals* above), and with this aim in view Dr. P. T. K. NAYAR, one of the Assistant Medical Officers, attended an intensive course of study of modern methods of treatment of tuberculosis at the Brompton Hospital, London. The scheme aims at the provision of a fully equipped and special ward and the establishment of an out-patient clinic; a modest beginning has already been made to provide these

special T.B. services. In-patients at State Hospitals treated for *pulmonary tuberculosis* numbered 442 and 136 died ; for *other respiratory diseases* 694 cases and 71 deaths were recorded. To the Group Hospitals (estate populations) 473 patients were admitted suffering from *pneumonia* and 146 deaths were ascribed to this cause.

Other diseases.—During the year in the State as a whole 301 deaths were registered as due to *ankylostomiasis*, 647 cases were treated in State Hospitals with 13 deaths and 226 in Group Hospitals with 2 deaths. *Beriberi* caused the deaths of 144 persons, 99 of these being Malays, 31 Chinese and 11 Indians ; no mention of the special investigation of lines of treatment is made (see this *Bulletin*, 1938, Supp., p. 193*). Kedah *lepers* continue to be accommodated and treated at the four institutions outside the State ; during the year 213 were under treatment, 14 died and 16 absconded. In a special Appendix the new policy regarding the control of leprosy is discussed (see below, *Scientific*). Deaths ascribed to *syphilis* numbered 29. A special *Venereal Diseases Clinic* is to be established in a room which is to be set aside for this purpose in the new Town Dispensary, Alor Star. The new *Dental Clinic* (see this *Bulletin*, 1938, Supp., p. 190*) has functioned with success since its opening in October 1937 ; during the last three months of the year 215 new cases and 250 re-visits were recorded.

Scientific.—Each of the five State Hospitals has its own branch laboratory and during the year 43,728 specimens were examined. At the Central Laboratory, Sungei Patani, 7,413 specimens were examined but findings are not recorded.

Three special Reports appear as Appendices to the Report under review, *viz.* :

1. *A Health Survey of Langkawi Island* by Dr. E. D. B. Wolfe, who records the results of his examination of 2,800 persons, the sanitary condition of the island, etc.
2. *The New Policy regarding the Control of Leprosy* which aims at abolition of the former system of compulsory isolation by means which will induce sufferers to seek treatment voluntarily, etc.
3. *Report of a case of Hydrophobia* by Dr. R. Sivasambandam.

Financial.—Total expenditure on Medical Department services during 1937 amounted to $551,225. *P. Granville Edge.*

Perlis (1937).

Perlis is the most northerly of the Malay States, lying on the west coast of the Malay Peninsula. It is bordered on the interior by Siam to the north and Kedah to the south, and has an area of about 316 sq. miles.

Vital Statistics.—It is stated that the registration of births and deaths will eventually be carried out by an Assistant Medical Officer trained by the Senior Health Officer, Kedah. The relevant vital statistics for 1937 are shown in the accompanying Table.

[The Table on page 49 entitled " *Stillbirths according to Nationality and Sex* " actually presents *live* births with these distinctions : 105 *stillbirths* were recorded.]

There were 3 resident *European Officials*. *Asiatic Officials* resident numbered 360 with the same average number resident ; seven were invalided and two died.

Nationality	Population	Births	Birth rate	Deaths	Death rate	Infant Deaths	I.M.R.
Europeans ...	7	—	—	—	—	—	—
Eurasians ...	6	—	—	—	—	—	—
Chinese ...	6,224	257	41·3	173	27·8	37	144
Malays ...	43,497	1,474	33·9	725	16·7	142	96
Indians ...	977	23	23·5	23	23·5	3	130
Others (mostly Siamese) ...	1,992	39	19·6	44	22·1	7	179
Totals ...	52,703	1,793	34·0	965	18·3	189	105·4

The population of labourers and their dependents on *estates* totalled 436, distributed as to 361 Indians, 74 Malays and a single Chinese. Fifteen births and six deaths—all Indians—were recorded.

Maternity and Child Welfare Work.—One of the midwives trained at Alor Star for the newly created *Kampong* Midwifery Service (see p. 162, *supra*, and this *Bulletin*, 1938, Supp., p. 194*) was duly posted to her kampong in Perlis, and another pupil midwife has commenced her course of training. During the year 13 deaths were registered as due to diseases of pregnancy, childbirth, and the puerperal state. The Hospital midwife attended 4 labour cases in the homes of patients.

School Hygiene.—For the first time all women teachers in Malay Vernacular Schools were medically examined by the Lady Medical Officer, Kedah. Owing to the absence on leave during part of the year of the Assistant Medical Officer and of the Assistant Health Officer when attending a course of training in Kedah, the volume of work accomplished was somewhat less than usual. Ten schools were inspected and 948 children medically examined, the principal findings being summarized as follows :—*dental caries* 30·6 per cent., *enlarged spleens* 17·5 per cent., *anaemia* 17·2 per cent. Only 0·1 per cent. were affected with *yaws* ; 37 children received N.A.B. injections for the disease.

Public Health, Sanitation, etc.—The work of the Medical Department, Perlis, is supervised by the State Surgeon, Kedah (Dr. J. PORTELLY), who reports that the general health of the Perlis population during 1937 was good. Routine anti-malarial measures continued to be carried out and it is hoped by better control, and by anti-larval and drug prophylaxis to reduce malaria incidence in the endemic areas in course of time. Methods of *sewage and refuse disposal* remain as previously described (see this *Bulletin*, 1938, Supp., p. 194*). As regards *water supplies* these remain as described in the previous issue of the *Supplement* to this *Bulletin* ; reference is again made to the proposed installation of a filter plant at Padang Besar (see this *Bulletin*, 1938, Supp., p. 194*). Kaki Bukit still obtains its supply from sources liable to pollution ; the provision of safe supplies can only be met by the removal of the villages to a new site and this matter is receiving the attention of the authorities. Additions and improvements to market stalls are reported ; shops, street stalls, and hawkers are inspected at regular intervals, and licences issued only when prescribed sanitary standards are maintained. Steps are being taken to deal with unsatisfactory itinerant hawkers. *Hospitals, Dispensaries, etc.*—New Buildings for the accommodation of certain members of Medical Department staff were completed and occupied and various additions made to existing

buildings during the year. The medical institutions provided for in-patient and out-patient treatments remain as previously described (see this *Bulletin*, 1938, Supp., p. 194*). At the General Hospital, Kangar, 1,707 in-patients were dealt with and 89 deaths were recorded, 36 of these deaths occurring within 48 hours of admission : 806 of the patients were Chinese, 594 Indians and 288 Malays. Out-patients treated at this Hospital numbered 5,443 and of these 3,286 were Malays, 1,211 Indians, and 887 were Chinese. [The racial proportions among in-patients and out-patients are striking. Among in-patients Chinese head the list with 47 per cent., while only 17 per cent. were Malays, but among out-patients the positions become reversed, Malays 60 per cent., Chinese 16 per cent.] The Outdoor Dispensary at Kaki Bukit dealt with 6,315 new cases, and the Travelling Dispensary 411 cases (exclusive of those treated at Schools, Coolie Lines, etc.)

In common with usual experience *malaria* and *fevers unspecified* were responsible for the largest proportions of the total deaths registered in Perlis during 1937—no less than 41 per cent. of the deaths due to all causes appear under these two titles. Only 19 deaths were specifically assigned to *malaria* but 376 were due to *unspecified fevers*. Hospital in-patients treated for malaria numbered 457 and 10 died. Types of infection are not differentiated in the Hospital Returns, but among 4,872 blood-films examined at the Hospital Laboratory, Kangar, 1,912 contained malaria parasites, the percentages and types being *benign tertian* 51·4, *subtertian* 38·5, *mixed infections* 9·8 and *quartan* 0·3 per cent. Larval surveys indicated *A. barbirostris* as the most prevalent type, followed in descending order by *A. hyrcanus* and *A. maculatus*.

Twelve cases of *cerebrospinal fever* (all Chinese and mostly mining coolies) were notified. Eleven of the cases occurred in Kaki Bukit and its suburbs, an insanitary area where conditions are ideal for the spread of such a disease. Ten of the cases were treated in Hospital with 5 deaths. Prompt and energetic action succeeded in suppressing the outbreak. No case of *typhus* or *smallpox* was reported ; 1,796 vaccinations were performed.

Rabies.—Seven persons were bitten by dogs actually rabid or suspected of being rabid ; two were treated at Alor Star and three at Kangar Hospital. One refused treatment and died a month later, and another reported at the Hospital a month after the bite and developed hydrophobia the day after admission and died. (This case is referred to in the Kedah Report, above.) The brains of two dogs sent to the Institute for Medical Research, Kuala Lumpur, were declared positive for rabies.

Ten deaths were ascribed to *enteric fever* in the State as a whole. Four cases of *typhoid* fever with one death and one fatal case of *paratyphoid* were treated in Hospital. Hospital patients treated for *dysentery* numbered 29 and 3 deaths were recorded ; 14 of the patients were suffering from the amoebic type of the disease.

Forty-seven deaths were registered as due to *pulmonary tuberculosis*. Cases admitted to Hospital numbered 54 and of these 51 were pulmonary ; 11 hospital deaths were recorded. Deaths due to *pneumonia* (all forms) in Perlis totalled 23 ; 44 cases with 15 deaths appear in the Hospital Returns.

Of the 4 Perlis *lepers* one was accommodated at the Pulau Jerejak Leper Settlement, Straits Settlements, and three at Sungei Buloh, F.M.S.

Other diseases mentioned in the Hospital Returns include 82 cases of *ankylostomiasis*, 107 of *influenza*, 54 of *ulcers* and 32 of *chickenpox*.

In the tabulated *causes of death* it is noted that 46 deaths are ascribed to "*Demam Batok*" a term which vaguely connotes *feverish cough*.

Scientific.—Of the 8,205 specimens examined at the Laboratory, 4,872 were the blood-films already mentioned under *malaria* in the preceding notes. As regards the remainder these included 1,740 faecal specimens, 1,252 giving positive findings and 283 specimens of sputum of which 32 contained *Myco. tuberculosis*.

Financial.—Expenditure on Medical Department services during 1937 amounted to $45,649 a sum which represents 6 per cent. of the total revenue, or 7 per cent. of the total expenditure of the State during the year under review. *P. Granville Edge.*

Kelantan (1937).

The State of Kelantan is on the eastern side of the Malay Peninsula. On the north is the China Sea, on the south Pahang, on the east Trengganu and the China Sea, on the west Perak and Siamese Territory. The area is estimated at 5,720 sq. miles, or rather less than that of Yorkshire.

Vital Statistics.—Births and deaths registration became compulsory only in July 1930. It is said that amongst Malays and other races registration is fairly complete, but information is lacking regarding births and deaths occurring among inhabitants of the remote and hilly districts of Ulu Kelantan, where many aboriginal tribes are to be found. The relevant facts for the year under review read as follows :—

Race	Estimated Population	Births	Birth Rate	Deaths	Death Rate	Infant Deaths	I.M.R.
Europeans ...	80	2	25·0	3	37·5	1	?
Malays ...	354,844	9,733	24·6	6,278	17·7	1,099	112·9
Chinese ...	27,034	698	25·8	396	14·6	64	91·7
Indians ...	10,401	225	21·6	200	19·2	48	213·3
Eurasians ...	72	0	—	2	27·8	0	0
Others ...	7,947	153	19·2	106	13·3	9	58·8
Totals ...	400,378	10,811	27·0	6,985	17·4	1,221	112·94

Deaths are classified in the Report under review by race, age groups, and by principal causes.

Of *European Officials* there were 28 resident with the same average number resident; no invalidings or deaths were recorded. Of the 1,057 *non-European Officials*, with the same average number resident, it is noted that eleven were invalided and five died during the year.

The total labour force with their dependents on *Estates* is returned as 6,135, but these are exclusive of Estates employing entirely Malay or Chinese labour as for such properties data are not reliable. Of the total of 6,135 persons, 3,736 were Indians and their dependents and among this group 111 *births* and 109 *deaths* were recorded, giving birth and death rates 29·7 and 29·2 respectively. There were 33 *infant deaths* so the infant mortality rate would be 297·2 per 1,000 registered births.

Maternity and Child Welfare Work.—There is no special Maternity Hospital in the State, but maternity beds are available at the Kota Bharu Hospital where however, in spite of every effort, services are not so far popular among Malay women. During the year 187 deliveries were recorded at the Hospital, and of these 122 were Indian women, 59 were Chinese, but only 1 was a Malay. Free facilities are provided for ante-natal treatment and delivery of women from *Estates.* Provision was made for the training of four Malay *bidans,* but owing to the illiteracy of Malay women, difficulty was experienced in obtaining suitable candidates, with the result that only one was selected to commence the course of training (see this *Bulletin,* 1938, Supp., p. 197*).

An *Infant Welfare Centre* was started in premises acquired in the market area of Kota Bharu, the work being under the charge of a part-time Assistant Lady Medical Officer assisted by an Infant Welfare Nurse. This undertaking has made a most successful beginning; the clinic is popular and attendances have steadily increased month by month. The Health Nurse, after her daily work at the Clinic, visits homes in Kota Bharu and in adjacent kampongs from which births have been reported. The record of the year's work shows that 1,343 visits were paid to newly born infants, 1,497 visits were paid to women (958 of these to Malay women) and 1,173 to children (of the latter, 703 were Malay children).

School Hygiene.—During the year 1 English and 42 Malay Vernacular Schools were inspected and 2,998 school-children medically examined. In towns the general sanitary condition of the schools is satisfactory and it is also said that in areas where anti-malarial measures are efficiently carried out spleen rates are low. Among other findings it is said that minor *skin diseases* are common and the percentage among children examined was 21·8; *dental caries* is equally prevalent with 21·2 per cent. of the pupils examined, *anaemia* was present in 5 per cent., and *diseases of the eye* in 2·6 per cent., while 48 cases of active *yaws* were detected and referred for treatment. A list of pupils and their defects is given to the teachers; in towns, necessary treatments are supplied at Hospitals and Dispensaries, and in rural areas by Travelling and Pack Dispensaries during the course of their weekly visits. Hygiene is taught in the schools by teachers.

Public Health, Sanitation, etc.—The lack of a satisfactory index of the general health of the State is again referred to (see this *Bulletin,* 1938, Supp., p. 197*). For purposes of public health administration the State is divided into five Districts which cover the main centres of population. Anti-malarial work was carried out along lines previously described in the notified areas; the zone of control in Kuala Krai was considerably extended. Additional work undertaken during the year included control measures in a Chinese rubber estate near Kuala Krai, the canalizing of the Sungei Krai, the construction of earth drains and the replacement of roadside ditches by concrete drains. Frequent larval surveys were undertaken and regular mosquito surveys were continued.

The single bucket system of *sewage disposal* continues in use (see this *Bulletin,* 1935, Supp., p. 180*). Considerable extension of the service is necessary for many houses in the towns and kampongs lack sanitary latrines and are still dependent upon primitive methods of

disposal of excreta. Every effort is being made to bring about improvement; where the erection of new houses and repairs to old ones are approved the construction of sanitary latrine accommodation is made compulsory. Kota Bharu is still the only town in the State having piped *water supplies*, but even here shallow wells inadequately protected are largely used. In all premises licensed for the sale or manufacture of foods and drinks the use of piped supplies has been made compulsory. In other towns in the State supplies are obtained from wells, streams and rivers; having regard to the fact that bowel diseases are almost universal, provision of piped supplies is a sanitary necessity. Matters concerned with *housing and town planning* continued to engage the attention of the responsible authorities, defects are being remedied and improvements in existing conditions gradually effected. The inspection of premises where *foods and drinks* are prepared or offered for sale was continued; it is stated that conditions in remote villages are in need of great improvement.

On *Estates* subject to medical inspection the housing of labourers, medical aid and all other matters concerned with the physical welfare of employees received considered attention.

No provision exists for the *training of sanitary personnel*, but it is noted that all the Sanitary Inspectors employed hold the Certificate of the Royal Sanitary Institute, London.

Port Health Work.—Coasting steamers plying between Singapore and Bangkok call at Tumpat where the Chief Hospital Assistant at the Tumpat Dispensary acts as Deputy Health Officer and inspects all passengers; during the year 175 steamers with 433 passengers called at the port, but no case of infectious disease was recorded.

Hospitals, Dispensaries, etc.—Hospitals maintained by the Medical Department remain as previously described except that it is necessary to add that certain extensions to existing buildings were completed during the year (see this *Bulletin*, 1937, Supp., p. 192*, and 1938, Supp., p. 198*). In addition to the Out-patient Departments established at all Hospitals, there are *Dispensaries* at five centres, 2 *Motor Travelling Dispensaries*, 2 Outboard *Motor Prahu Dispensaries*, and 2 *Pack Dispensaries*. The volume of work dealt with by Hospitals and Dispensaries during the year may be set out as follows:—

Institution	Admitted	Treated	Deaths	Out-patients	Attendances
Hospitals ...	6,358	6,663	249	40,057	52,292
5 Dispensaries ...	—	—	—	41,083	66,500
6 Travelling Dispensaries ...	—	—	—	—	160,489

Information concerning *disease incidence* in the State is available only from the records maintained by Hospitals, Dispensaries, and Travelling Dispensaries; reference to some of the diseases treated during the year is made in the notes which follow.

Malaria is the principal disease and chief cause of death in the State—it is mainly prevalent in the foothills of Ulu Kelantan and is endemic on most of the rubber estates lying along the banks of the Kelantan River. During the year under review there was a marked increase in the number of malaria cases admitted to hospitals, attributed in part to the Japanese Iron Mine at Temangan where

health conditions remained unsatisfactory with malaria highly prevalent. The advisability of changing the line site on this Mine and erecting lines in clearings remote from jungle is under consideration. Hospital returns show 2,078 patients admitted for malaria and 2,110 treated, with 64 deaths, and in addition 18 cases of *blackwater fever* admitted from estates and mines were treated, with two deaths. Among the total cases treated *subtertian* infections predominated with 1,310 cases; of *benign tertian* there were 247, of *quartan* 36, of *malarial cachexia* 187, mixed infections accounted for 13, and in 317 cases the type of infection was not determined.

Estate Health Statistics show that among 6,135 persons, 1,553 malaria cases were treated with 29 deaths.

At Hospital Laboratories and Dispensaries 8,811 blood films were examined for the presence of malaria parasites, but findings are not recorded. Mention has been made in the section *Public Health* above of anti-malarial work; it remains to add that the species caught during the frequent larval surveys included *A. maculatus* (the chief vector in hilly districts), *A. barbirostris*, and *A. hyrcanus* (prevalent in the flat coastal regions), *A. karwari*, *A. vagus*, and *A. kochi*.

No case of *plague* or *cholera* was notified: 1,760 anti-cholera inoculations were given to pilgrims to Mecca (see this *Bulletin*, 1938, Supp., p. 199*). Of *smallpox* 8 cases were reported among employees on an estate. Infection was traced to new arrivals from India; 13,000 vaccinations were carried out and quarantine measures were applied to the estate. In the State as a whole 26,265 vaccinations were performed during the year. One case of *tropical typhus* and two of *diphtheria* with one death were reported.

Nine cases of *enteric fever* were admitted to Hospitals making with three cases remaining from 1936 a total of 12 cases treated; four of these patients died. The source of infection was not traced in any of these cases. For *dysentery* 83 patients were treated in hospitals and 7 died; of the total cases 58 were amoebic, and 25 bacillary. *Diarrhoea and enteritis* was responsible for 69 in-patient cases and 6 deaths at ages 2 years and over, but no cases were recorded at ages under 2 years.

The incidence of *pulmonary tuberculosis* remains high; among 180 cases (160 admitted during the year) of all forms of tuberculosis 175 were pulmonary and 45 of these patients died. It is said that recorded cases are no true index of the amount of the disease in the State, for cases are rarely seen except in the advanced stages. Many of the cases recorded during 1937 were Government servants detected at the routine examination for pulmonary tuberculosis each year. Estate Health Statistics show 279 cases of "*lung diseases*" treated, with 40 deaths. *Pneumonia*, another serious cause of disability, and mortality was responsible for the admission of 118 patients and 36 deaths during the year.

No reference occurs in the text of the Report to *helminthic infections*. Hospital Returns show that 249 cases were admitted and 259 treated for *ankylostomiasis*, and 101 admitted and 105 treated for *ascariasis*. Estate Health Statistics record 64 cases of ankylostomiasis dealt with during the year.

Of *leprosy*, the Report observes "The number of lepers in the State is not known, but assuming the incidence rate is in the same proportion as in neighbouring States, the total number must go into thousands" (see this *Bulletin*, 1938, Supp., p. 199*). A survey of the State for the

disease is proposed. There is accommodation in the State for *male lepers only* near Tumpat. During the year 9 lepers were admitted to this small settlement, 19 were treated, 6 absconded, and one was discharged. Ten lepers were also accommodated at Pulau Jerejak (Penang), where 2 died, and 2 were accommodated at Sungei Buloh (Selangor). Treatment continued along lines previously described.

Facilities for the treatment of *venereal diseases* remain as described in the previous issue of this *Supplement*. During the year 2,242 new cases presented themselves for treatment. Among Hospital in-patients there were 101 cases of *syphilis*, 57 of *soft chancre*, 149 *gonococcal infections*, and 54 of *granuloma venereum*. Attendances at all treatment centres for *yaws* totalled 26,493, Malay patients accounting for 24,621 of the total attendances.

Among *other diseases* referred to in the Report under review, mention is made of *beriberi* ; 25 cases were admitted and 29 treated in Hospitals, but it is said that the true incidence of the disease in the State is not known. For chronic *ulcers* 321 patients were treated, while for *wounds* by cutting or piercing instruments 720 patients were dealt with.

Scientific.—At Hospital Laboratories 19,730 specimens were examined ; of these 8,811 were blood films, 4,984 faecal specimens, 4,577 specimens of urine, and 477 were specimens of serum submitted for Kahn tests. The results of these examinations are not supplied. The *Annual Report of the Veterinary Inspector* is presented as an Appendix to the Report under review. Mention is made of two cases of *rabies* both confirmed by the Institute of Medical Research, Kuala Lumpur. A muzzling order was introduced and instructions issued for the destruction of all unmuzzled dogs.

Financial.—Expenditure on Medical Department services in 1937 amounted to $201,945, a sum which represents 7·3 per cent. of the total expenditure of the State during the same year. *P. Granville Edge.*

Trengganu (1937).

The State of Trengganu lies on the eastern seaboard of the Malay Peninsula 4° and 5°5′ N. lat. and 102°20′ and 193°30′ E. long. It has an area of 5,050 sq. miles.

Vital Statistics.—It is considered that registration is now fairly complete with Deputy Registrars established at 42 centres (see this *Bulletin*, 1938, Supp., p. 200*). Any fine analysis of the causes of death would be useless having regard to the fact that less than 3 per cent. of the total deaths registered are certified by qualified medical practitioners. The relevant facts for the year under review are as follows :— *Estimated mid-year population* 198,246 ; *registered births* 6,845 ; *deaths*, 4,427 ; *infant deaths* 1,202 ; *stillbirths* 295. The crude birth and death rates were 34·5 and 22·3 per 1,000 respectively, the infant mortality rate 175·6 per 1,000 live births and the stillbirth rate 43 per 1,000 births.

The average monthly population on *Estates and Mines* during 1937 was 7,202. During the year 84 deaths occurred amongst employees and their dependants.

Europeans resident in the State numbered 27 and of these 20 were *European Officials* with an average number resident of 14. One invaliding only was recorded but no deaths.

Maternity and Child Welfare Work.—There are 5 midwives in the service of the Medical Department and a nurse also qualified as a midwife. Three other qualified midwives are resident in the State,

one of them employed by the Nippon Mining Company, Dungun. The volume of maternity work dealt with at various centres can conveniently be set down in the following manner :—

Centre	Maternity Cases Conducted.					
	Malays	Chinese	Indians	Others	Total	Maternal Deaths
Kuala Trengganu Hosp.	13	84	4	1	102	1
,, ,, Town Clinic (Japanese Midwife)	61	37	1	2	101	0
Besut (Malay Midwife)	50	4	1	0	55	0
Dungun (Indian Midwife)	12	19	0	0	31	0
Kemaman (Chinese Midwife)	2	57	1	1	61	0
Totals	138	201	7	4	350	1

Of the 175 women who made 307 attendances for ante-natal examination at these centres 114 were Malays, 52 were Chinese, 6 were Indians and 3 were members of other races.

At the Kuala Trengganu Town Clinic 69 patients attended for ante-natal treatment ; 225 infants under one year of age and 1,117 children between the ages of one and twelve years also attended for treatment. It is hoped to build up gradually *child welfare* services in the districts with the assistance of local midwives. It is interesting to note that infant mortality rates are high in the south and much lower in the north of the State, while highly malarious inland districts show lower rates than urban areas. Malaria would not therefore seem to be the major factor in the problem of infant mortality—in inland districts where money is scarce, breast-feeding is the practice, but in the towns sophisticated foods replace the natural method.

School Hygiene.—Twenty-three Government Schools and ten Private Schools were inspected during the year and 2,148 children medically examined, which means that 85 per cent. of the children on the registers were dealt with ; of the total children examined 1,232 were in Kuala Trengganu schools. Pupils showing enlarged spleens formed 3 per cent. of the total examined ; spleen rates for coastal towns ranged from 0·8 per cent. to 27·4 per cent., and for inland areas between 2·8 per cent. and 42·9 per cent. Signs of yaws were noted in 3·8 per cent. of the children examined, mostly tertiary lesions of the hands and feet. Dental caries was noted in 50 per cent. of the children. A " great number " of the pupils are said to be infected with worms ; in faecal specimens of 116 pupils in Kuala Trengganu 111 were positive with ova.

Public Health, Sanitation, etc.—There are now Town Boards at *ten* places (see this *Bulletin*, 1938, Supp., p. 202*). During the year the Medical Officer was appointed Health Officer, Kuala Trengganu, Assistant Health Officers were appointed at Chukai and Dungun, and in smaller places Dressers act as Health Inspectors. It is said that the larger towns are free from malaria and that *anti-malaria measures* are most needed where such are most difficult to implement. Mosquito surveys were carried out by Health Inspectors in various areas. As regards *sewage disposal* a " double pail " system was inaugurated in Kuala Trengganu superseding the former system, and

in Kuala Dungun and Chukai the conservancy systems were extended ; elsewhere conditions remain unchanged (see this *Bulletin*, 1937, Supp., p. 196*). Disposal of *refuse* is by controlled tipping in the larger towns and by burning and burying in the villages. The position in respect to *water supplies* remains as previously described (see this *Bulletin*, 1937, Supp., p. 196*). In the crowded parts of Kuala Trengganu water sold by bullock cart is obtained from wells potentially dangerous.

Housing and Town Planning matters continue to engage the attention of the Town Boards and progressive improvement is reported.

With regard to *labour conditions*, three mines have small hospitals and employ dressers and a fourth has a large hospital and dispensary and employs a qualified Indian sanitary inspector and staff of coolies. Health conditions on estates are said to have been greatly improved ; lines have been reconstructed, piped water supplies installed, crèches for children established, and anti-malarial works undertaken. All mines and estates were visited by the Medical Officer or by Assistant Medical Officers and Sanitary Inspectors during the year. Premises licensed for the manufacture and sale of *foods and drinks* are regularly inspected by Health Inspectors.

Port Health Work.—The passengers and crews of 241 junks were examined and special precautions taken in view of the continuance of *cholera* in Siam.

Hospitals, Dispensaries, etc.—Additional accommodation was provided by the completion of new buildings during the year. These included new wards to the Kuala Trengganu Hospital, the first ward of a new hospital at Kuala Dungun, a ward at Chukai, Kemaman Hospital where a new hospital is being built. With these additions there are now 213 hospital beds available for in-patients. The work performed at all hospitals during the year is detailed hereafter :—

Hospital	Beds	Admissions	Treated	Died
Kuala Trengganu, General	158	2,622	—	49
,, ,, Gaol	7	64	—	1
Kuala Dungun	20	453	—	7
Chukai, Kemaman	28	275	—	9
Totals	213	3,414	3,538	66

For the treatment of out-patients permanent *Dispensaries* are established at 7 centres (these also include Out-patient Departments at Hospitals), there are 6 *Travelling Dressers* who deal with cases in outlying villages, *vaccinators* who distribute medicines during their visits, and 11 *Police Stations* and 4 *Customs Stations*, situated in places where there are no dispensaries, supplied with stocks of simple drugs. Patients treated during the year were :—

	New Cases.	Attendances.
By Dispensaries and Travelling Dressers	125,740	157,853
,, Vaccinators	15,822	16,571
,, Police and Customs Stations ...	863	863

Hospitals maintained by Mining Companies and Estates have been referred to in the Section *Public Health* above.

The most reliable information as regards the *incidence of disease* in Trengganu is supplied by the statistics of patients treated at Hospitals

and Dispensaries, and the notes which follow briefly summarize references to some of the prevailing diseases discussed in the Report under review.

The incidence of *malaria* varies widely in different parts of the State, these variations being indicated by the spleen rates recorded at the medical examinations of school-children (see *School Hygiene* above). During the year under review there were 579 admissions to Hospitals for the disease (representing 17 per cent. of the total admissions) and 587 patients were treated for malaria with 8 deaths. For the total cases treated types of infection were distributed as to 188 *subtertian*, 113 *benign tertian*, 24 *quartan*, 12 were mixed infections, 13 malarial *cachexia* and 237 were unclassified. Out-patients treated at Hospitals and Dispensaries totalled 20,860. No case of *blackwater fever* was recorded.

Mining Companies with an average monthly population of labourers and their dependants of 5,042, reported 1,247 cases of malaria and 8 deaths. *Estates* with an average monthly population of labourers and dependants of 2,160 supply no record of malaria cases but report 7 deaths due to this cause.

It is of interest to note that in the State as a whole only 84 deaths were medically certified as being due to malaria, while 2,677 deaths were ascribed to unspecified fevers; 19 of the latter were stated to be due to "*demam kepialu*," which means a long, continuous fever and might be enteric or typhus, but no cause can be assigned to the remainder (see also this *Bulletin*, 1938, Supp., p. 203*).

At the Laboratory where 4,180 blood films were examined, 3,603 gave negative findings; the positives included 290 *P. falciparum*, 228 [? 221] *P. vivax*, 33 *P. malariae*, and 33 mixed infections.

No case of *plague, cholera, smallpox* or other dangerous infectious disease was reported; during the year 12,394 anti-smallpox vaccinations were performed and of these 11,742 were primary vaccinations.

Three non-fatal cases of *tropical typhus* were treated at Hospitals; all diagnoses were confirmed by serological tests and typed as to 2 "Scrub" type (*Proteus X* "K" strain) and one "Shop" type (*Proteus X* "W" strain).

Only 9 (non-fatal) cases of *enteric fever* were reported. At the Laboratory where 26 Widal reactions were performed, in 5 cases the serum agglutinated positively with *Bact. typhosum* and 1 with *Bact. paratyphosum B*. Sixty-two in-patient and 196 out-patient cases of *dysentery* were dealt with; 19 of the in-patient cases and 24 of the out-patient cases were amoebic dysentery. Six Hospital deaths were ascribed to the disease. On *Mines and Estates* 38 cases of dysentery were recorded. Among 4,239 faecal specimens examined at the laboratory 13 were found to contain the protozoon *E. histolytica* alone or with other infections.

Fifty-one deaths in the State are said to have been due to *tuberculosis*. It is noted there were 78 in-patient cases of tuberculosis (all forms) and of these 74 patients were suffering from the *pulmonary* form of the disease, and 17 died (*i.e.*, 26 per cent. of total hospital deaths). The majority of the patients were Chinese. At the laboratory where 492 specimens of sputum were examined, 70 were positive with *Myco. tuberculosis*.

Beriberi was less prevalent during the year under review. Deaths due to this cause in the State as a whole numbered 23; cases treated by the Medical Department totalled 1,190 and of these 117 were

in-patients of whom 2 died. On Mining properties 291 non-fatal cases were reported. Incidence is said to be greatest among the Chinese, in women it is usually noted after a confinement, it is rare in the interior where home-grown rice is the staple diet, but common on the coast. The low mortality is partly attributed to the fact that all cases were treated with concentrated injections of Vitamin B_1.

Helminthic infections are very prevalent ; 72 per cent. of the 4,239 faecal specimens examined at the laboratory had some kind of helminthic infestation which was usually multiple with *ancylostoma* present in 27·4 per cent., *ascaris* 52·3 per cent. and *trichuris* 45·2 per cent. Hospital Returns show 111 in-patient cases of *ankylostomiasis* and 143 of *ascariasis*.

Leprosy.—During the past five years a register has been kept of all lepers coming to the notice of the Medical Department. Of the 90 persons recorded over the period, 28 have died, 10 have left the State, 6 are at the Leper Settlement, Sungei Buloh (Selangor, F.M.S.), 16 cannot be traced and 30 are known to be alive.

Venereal Diseases.—It is said that *syphilis* is rarely seen among local Malays and that the majority of the cases are Chinese. Admissions to hospitals with distinction as to race were as follows :—

	Malays	Chinese	Indians	Others	Totals
Gonorrhoea	103	54	44	0	201
Syphilis	3	22	7	1	33
Soft Sore and Granuloma venereum	9	11	9	0	29

In addition to the above, 1,018 persons received out-patient treatment for gonorrhoea. The figures are said to be no measure of the incidence of the disease, which is believed to be very common in the towns.

Cases of *yaws* treated during the year were, *in-patients* 231 and *out-patients* 3,694 (see also *School Hygiene* above).

Laboratory Returns show that out of 244 Kahn tests, 50 were positive and that 204 out of 366 specimens were positive with *N. gonorrhoeae*.

Other diseases dealt with by the Medical Department included 4,797 cases of *influenza*, few cases of *mumps*, *chickenpox*, *measles* and *whooping-cough*, 377 in-patient cases of *ulcers*, and upwards of 200 of *wounds* and *fractures*. Menaces to life other than those contributed by disease, are evidenced by the mention of 8 persons killed by tigers, 1 by an elephant, and 1 by a snake.

Scientific.—The Kuala Trengganu Hospital is equipped with a laboratory, and all permanent dispensaries are supplied with microscopes for the confirmation of clinical diagnoses. Specimens examined and findings recorded are summarized in an Appendix to the Report under review and have been referred to in the preceding notes.

Financial.—Total expenditure on Medical Department services during 1937 amounted to $112,516, a sum which represents 4·2 per cent. of the total revenue of the State (or 4·3 per cent. of the total State expenditure) during the same year. *P. Granville Edge.*

REVIEWS AND NOTICES.

RODENWALDT (Ernst) [Dr. med., o. ö. Professor der Hygiene in Heidelberg]. **Tropenhygiene.** [Tropical Hygiene.]—pp. ix+146. With 11 figs. 1938. Stuttgart: Ferdinand Enke, Verlag. [Unbound Rm. 8; Bound Rm. 9·60.] [Review appears also in *Bulletin of Hygiene.*]

The author has had a long tropical experience and his conclusions from it are embodied in this book. This is not one of those manuals to which people can turn for detailed instruction on practical measures of hygiene in the tropics, but the author expresses views which are of much general interest.

Climate, fitness for service, settlements and housing, diet, water, refuse and excreta, clothing and bodily activities are dealt with in that order, the subject matter being in two subdivisions, the first applicable to Europeans and the second to the indigenous peoples.

Acclimatization of Europeans in tropical regions is a topic which should be considered from the individual as well as from the racial point of view. The tropical area is to be thought of not as a place lying between two rigid lines, but rather as a series of regions, often disconnected, which possess certain meteorological characteristics as regards rainfall, atmospheric humidity, solar radiation and temperature. Many conclusions formerly reached about climate were really based on the effects of disease on the individual. That the blond, light-eyed northern European type with a tendency to corpulence is less well adapted for life in the tropics than the dark-haired, dark-eyed southern European is an idea that belongs to the early days of tropical hygiene.

The healthy European woman can live in the tropics, and the more normal in respect of health conditions life in the tropics is made, the less need married life there differ from that at home. Government and private concerns sending out a man even for his first tour, should ensure that he can take a wife with him. The unmarried man of inferior education usually falls under the degrading influence of a half-coloured household, and the educated man often finds himself forced to lead a dual life; he may become so entangled in the end that he cannot marry a European. Under pressure of such conditions many able and carefully selected men fail to leave any issue, a deplorable loss of the best stock.

The author discusses the subject of health propaganda, especially in relation to the indigenous peoples. He takes an optimistic view, largely as a result of his own experience in this matter. He thinks it essential that the methods adopted should be developed gradually from beginnings which will aim primarily at obtaining the co-operation of the people. Successful treatment of their most troublesome diseases is one of the easiest beginnings in gaining their confidence. A common cause of failure is trying to teach too many things at a time, and another is extending the effort over too large an area. He refers with approval to the methods employed by the workers of the Rockefeller Foundation. In particular he mentions the successful work of HYDRICK in Java as a useful model [see *Bulletin of Hygiene*, 1937, Vol. 12, p. 674]. He fully recognizes that where millions of widely distributed rural dwellers are concerned the progress of the prevention of disease along the present lines must be slow. *D. B. Blacklock.*

GHOSH (Birendra Nath) [M.B.E., F.R.F.P. & S. (Glasg.)]. **A Treatise on Hygiene and Public Health with Special Reference to the Tropics.** Ninth Edition.—pp. xvi+720. With 169 figs. 1938. Calcutta : Scientific Publishing Co. [15*s*.] [Review appears also in *Bulletin of Hygiene*.]

This edition, the ninth, of Ghosh's Hygiene and Public Health, appears only three years after the previous one, but nevertheless it contains much new material. Several chapters have been largely rewritten and others revised, incorporating recent knowledge. For writing and revising the different sections the author acknowledges his indebtedness to various workers:—MEGAW, relapsing fever, typhus, epidemic dropsy and beriberi ; ORKNEY, maternity and child welfare ; Berkley HILL and MAITI, mental hygiene and mental disorders ; LAL, vital statistics ; WILSON, food and diet in India. He also expresses indebtedness to STEWART for generous assistance and co-operation.

Means for the prevention of the spread of tuberculosis are being seriously considered in India, as elsewhere in tropical and sub-tropical regions. The mortality from tuberculosis has been steadily rising in India, especially in the cities and towns, owing to a combination of factors, mostly social and economic. In Peshawar city out of 75,000 persons examined in 1927, 3,000 were detected as suffering from active tuberculosis.

Leprosy is one of the important diseases in India, the estimated number of cases being a million. Of these 80 per cent. are non-infectious, 10 per cent. slightly infectious and 10 per cent. highly infectious. The young being the most easily infected it is above all necessary to adopt preventive measures to minimize this risk.

" No lice, no relapsing fever is an axiom," is perhaps somewhat of an over simplification, especially as tick-borne relapsing fever is described immediately after this. The frequent application of kerosene and oil recommended by the author is a more promising method of getting rid of lice and nits than the usual perfunctory dip in a bath of chemical solutions, so dilute that they do not affect the eyes.

With regard to yellow fever, which may be one of India's greatest problems of the immediate future, the rôle of mosquitoes other than *Aëdes aegypti* might have been given more prominence. The prevalence of rural yellow fever in South America may later have its counterpart in the East. In the same connexion it might be advisable to discuss the possible advantages of protective inoculation on a large scale as a measure of public security against yellow fever. The author is apparently unreceptive of the hints of the reviewer of the 8th edition on the yellow fever section, or else, it may be, unrepentant.

The increasing realization of the importance of closer attention to maternity and child welfare is evidenced in the section contributed by Dr. Jean ORKNEY. Village sanitation is becoming such an all-pervading problem to the public health departments in India that no doubt it will be worthy of receiving increased space in future editions.

The present volume is one which can be recommended to students. In it they will find something of assistance in relation to the public health on almost any of the multifarious subjects of which they will be called upon to display some knowledge. Everyone engaged in public health practice in the tropics and sub-tropics will also find this new edition a useful guide.

D. B. Blacklock.

TROWELL (H. C.) [M.D., M.R.C.P. (Lond.)]. **A Handbook for Dressers and Nurses in the Tropics.** Illustrations by Margaret TROWELL.—pp. ix+612. With 179 figs. 1938. London : The Sheldon Press, Northumberland Avenue, W.C.2. [8*s.* 6*d.*]

The author of this handbook has had considerable experience in training auxiliary medical staff in East African colonies. It is divided into three parts dealing respectively with Nursing, Medicine, and Surgery, each with its own index. Each part is obtainable as a separate small volume.

It is written in simple language and should be readily understood by the average African who has passed through a middle school. Technical terms are avoided as far as possible. The author has wisely laid stress on important principles and has avoided tabulations, which are liable to be memorized without being fully understood. The simpler methods of treatment are clearly explained and the importance of prevention has not been overlooked.

The general standard of accuracy is high. In stating that the insect host of Onchocerca is unknown, the work of BLACKLOCK on *Onchocerca volvulus* and its transmission by *Simulium damnosum* in Sierra Leone has evidently been overlooked.

The book is admirably illustrated with a large number of simple diagrams mostly executed by the author's wife. It supplies a real need and will be of great value in the teaching of nurses and dressers in tropical Africa. *W. H. Peacock.*

MUDALIAR (A. Lakshmanaswami) [B.A., M.D., F.C.O.G., Professor of Obstetrics, Madras Medical College, University of Madras, Second Obstetric Physician and Gynaecologist, Government Hospital for Women and Children, Egmore, Madras]. **Clinical Obstetrics.**—pp. xi+819. With 213 figs. (9 coloured). 1938. Oliver & Boyd, Edinburgh, Tweeddale Court & London, 98, Great Russell Street, W.C. [27*s.* ; Rs. 18.] [Review appears also in *Bulletin of Hygiene.*]

This is a large, well-illustrated Text-Book of Obstetrics by a writer of considerable experience.

There is a good chapter on tropical diseases, which includes such subjects as malaria, kala azar, blackwater fever, cholera, filariasis, beriberi, hookworm and so forth. The effect of a malaria epidemic appears to be, to cause a fall in the live birth-rate due to abortion, premature labour and stillbirths. How far this may be attributable to the necessary treatment of the malaria and how much to the disease itself we ourselves are not prepared to say. The author is definitely of the opinion " that the danger lies in allowing a pregnant woman with malaria to go on without administration of adequate doses of quinine." He regards the chief causes of the interruption of pregnancy as being the toxaemia of malaria and the high temperature, rather than the quinine.

The chapter on the diseases of the blood is also well written. He is of the opinion that owing to the prevalence of some degree of anaemia in the tropics, especially during the last three months of pregnancy, " it should be a rule in all ante-natal clinics to make a thorough haematological examination in every case." " This should form one of the main features of ante-natal work in the tropics." The blood is indeed rather more fully dealt with than is usual in books of this kind.

There are also chapters on diseases of the heart and lungs, and we may say that we regard the parts of this work which deal with general and tropical medicine as among the most useful and informative in it.

With regard to Midwifery in general the work is a safe guide to the student and practitioner, although some readers may differ from the author occasionally on minor points. For example, we are of the opinion that it is seldom wise or necessary to treat a vesicular mole by hysterotomy, and we think this operation is over-emphasized as a method of dealing with this condition. Separation of the mole by passing two fingers into the uterus is mentioned with reference to those cases in which the os is somewhat dilated.

On the whole, the book should, in our opinion, prove to be a valuable addition to the library of those working in the tropics.

R. E. Tottenham.

OESTERLIN (Manfred). **Chemotherapie. Ergebnisse, Probleme und Arbeitsmethoden.** [Chemotherapy. Problems, Modes of Action, and Results.]—pp. viii+359. With 39 figs. 1939. Braunschweig: Friedr. Vieweg & Sohn. [Bound 22·50 Rm.; Unbound 20 Rm.]

To compile a comprehensive work upon chemotherapy as a whole, and especially a concise account of its recent triumphs in the tropical field, and thereby to endeavour to deduce some underlying basis for therapeutic action, as has been so efficiently done by Dr. Manfred Oesterlin in 348 closely crowded pages, is no mean performance. The work which is well illustrated with selected photomicrographs bears the stamp of sincerity, thoroughness and originality which has come to be associated with the Institute of Tropical Medicine in Hamburg.

The theme of chemotherapy concerns us all, whether bacteriologists, parasitologists, pathologists or clinicians. This, then, is chemotherapy with a definite goal: it is to epitomize the therapeutic conquests already attained and to indicate new avenues of progress. The resulting study naturally includes the biological aspects of parasites in relation to their chemotherapeutic reactions. General considerations include the principles of animal experimentation, the specificity of parasites, the influence of different media, the rôle of laboratory animals and prophylactic chemotherapy.

The biological section deals especially with trypanosomes and spirochaetes; changes in their virulence and variations in their pathogenic action, their behaviour in intermediate hosts, methods of culture, chemotherapeutic index and their reactions to specific drugs are matters of fundamental importance. The survey embraces the technique of estimating the therapeutic efficacy of salvarsan and allied compounds.

Blood protozoa of the genera *Plasmodium* and *Halteridium* claim a good deal of attention and there is included a *résumé* of the classical researches of ROEHL and his successors. Next in order follow *Entamoeba histolytica* and the *Piroplasmata*. Attention is also devoted to helminthic infections and this portion is particularly well illustrated with photographic reproductions.

Section III concerns itself with the phenomenon of drug resistance which in itself forms an essay of some length, wherein the classical experiments of Warrington YORKE on acquired arsenic-resistance in trypanosomes and its transmission through the Glossina finds

honourable mention. The Chemical Section (IV) comprises the greater part of this book. Technical and detailed, of great importance to clinical medicine, it is nevertheless intelligible only to expert chemists.

Paradoxical as it may seem, that in searching for some *raison d'être* for chemotherapeutic research, it is necessary to state that many outstanding discoveries were made independently of each other and without any reasoned connexion. Among these we may place the discovery of *germanin* by ROEHL in 1916, *urea-stibamine* by BRAHMACHARI in 1922, *fuadin* by H. SCHMIDT in 1928, *plasmoquine* by SCHÜLEMANN, SCHÖNHÖFER and WINGLER in 1928, and lastly that of *atebrin* by MIETZSCH, MAUS and KIKUTH in 1930. Thus we are presented with the paradox of achievement outstepping chemotherapeutic theory.

The chemotherapy of arsenicals, as well as quinoline derivatives in malaria, *emetine* and *quinoxyl* in amoebic dysentery is explored in great detail. Helminthologists will find satisfaction in a similar examination of the various anthelmintics usually employed; and research workers will assuredly discover in the elaborate *Toxicity Table*, which forms an appendage, a sure shield in time of trouble.

This comprehensive work is well annotated and the many references to British workers are a compliment to their activities in this field. Its compilation has entailed an immensity of labour and it has succeeded, in the avowed object of its author, in stimulating thought and as an inspiration for future endeavour. The text is singularly free from errors and the one slip discovered is on p. 131 in the spelling of "Mietzsch." *Philip Manson-Bahr.*

LEWIS'S MEDICAL AND SCIENTIFIC LIBRARY. **Catalogue of Lewis's Medical & Scientific Lending Library. Part I.—Authors and Titles.** New Edition. Revised to the end of 1937.—pp. 8+550. 1938. London: H. K. Lewis & Co. Ltd., 136 Gower Street, W.C.1. [16*s.* (to Subscribers 8*s.*).] [Review appears also in *Bulletin of Hygiene.*]

The founding of Lewis's Medical and Scientific Lending Library in 1848 goes back to within a very few years of the time when CARLYLE, driven to distraction by the hours wasted in waiting for books at the British Museum, successfully agitated for the founding of a lending library for the use of scholars. Possibly Carlyle's plea, which led to the founding of the London Library, suggested the usefulness of a lending library of medical books for hard-pressed practitioners, and thus brought about the establishment of Lewis's library. Whether this be the case or not, the appearance of a new edition of Lewis's Library Catalogue, revised to the end of 1937, is a welcome reminder of the growth and continued usefulness of this library. The Catalogue is of books available in the library and is estimated to contain about 20,000 titles. Counting the large number of duplicates of all the most frequently required works the number of volumes in circulation and in the library to-day must be over 60,000, and expressed in terms of money a subscriber to Lewis's library has available for his study a collection of standard medical and scientific books worth something like £50,000. *R. L. S.*

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